NEWSPAPER

COMPUTERWORLD

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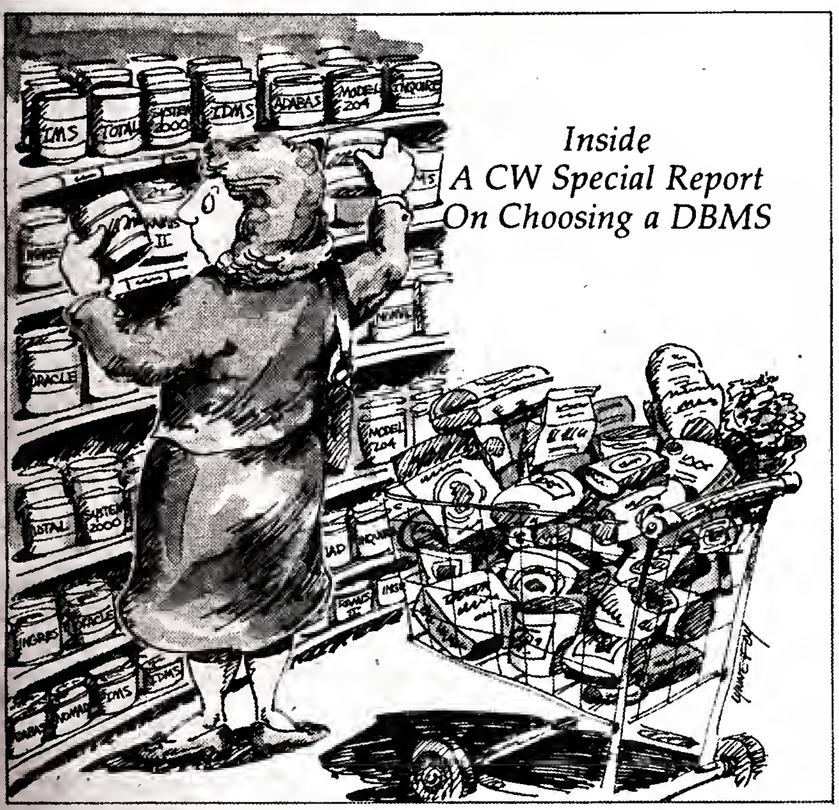

Inside
A CW Special Report
On Choosing a DBMS

IBM 4300, 8100 Lines Leave Users Confused

By Tom Henkel
CW Staff

One of the most confusing choices facing users that examine IBM's current product line is caused by the somewhat hazy distinction between its 4300 series and 8100 processors. Architecturally, the machines are vastly different. But when it comes to distributed processing, the machines seem to be aimed at the same marketplace.

Analysis

There is some overlap in the functions of the two product lines, IBM admitted, contending that the system that best suits a user's needs depends on the user's applications.

Generally speaking, the 8100 was designed as a line of distributed processors and the 4300 series was designed as a family of stand-alone processors, according to the vendor. Over time, however, both products have taken on additional capabilities that confuse the original intent, IBM said.

For example, the 8100 family was expanded last July with three larger 8140 models that offer 1.6 times the performance of the earlier largest processor and up to

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FCC Ruling Could Impact Class A Users, Resale Values

By Tim Scannell
CW Staff

WASHINGTON, D.C. — A Federal Communications Commission ruling handed down last month could hit thousands of computer users in the pocketbook and has already caused problems for at least one major computer vendor.

The ruling, which was adopted in 1979 and went into effect Oct. 1, requires all Class A-type computer equipment — machines manufactured for business and commercial use — to comply with FCC-supported radio frequency requirements. In short, computers, tape drives, disk drives and other equipment that emit excessive electromagnetic or radio "noise" — and thus interfere with such things as radio or broadcast signals — are in violation of the FCC ruling.

Users of equipment that violates the requirements will probably have to shield or even upgrade their machines at their own expense, according to one vendor familiar with the ruling.

In addition, the FCC's ruling could, over the long term, impact the resale value of computers and equipment not meeting certain government standards, a number of industry sources said.

The FCC ruling — officially called Docket 20780 — goes into effect immediately for equipment first placed in production after Oct. 1. Computers and peripherals in production prior to that date do not have to comply until Oct. 1, 1983, Herman Garlan, an engineering adviser to the Radio Frequency Branch of the FCC, said.

Vendors can manufacture new equipment within the FCC's energy emission guidelines, but the older computers — those already installed in the field and those in production — will have to be modified to comply. And modification costs will probably have to be picked up by the user, according to one vendor spokesman.

In most cases, equipment modification will only involve spraying offending

(Continued on Page 4)

Federal DP Inventory To Double by '85: NBS

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The federal government shows no sign of losing its standing as the world's foremost DP user, according to recent National Bureau of Standards statistics, which predict that the federal computer inventory will double by 1985.

The figures, released by the bureau's Institute for Computer Sciences and Technology, reaffirm a recent federal trend toward increased use of minicomputers with decreased purchases of medium-size mainframes.

By 1985, NBS said, minis should be about 80% of the projected federal computer inventory of more than 29,000 mainframes. The smaller units will represent some $8.67 billion, or about 10% of the dollar value of the government's installed computer base.

With just over 15,000 mainframes in 1980, the government should see a 21% growth rate in minis during the next five years, while large general-purpose machines will increase in number by approximately 6.5% annually.

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First Users Rate M80/43, Mark V

• *Magnuson M80/43 Called 'Rock-Solid Machine'*

By Jeffry Beeler
CW West Coast Bureau

BERKELEY, Calif. — The first user of Magnuson Computer Systems, Inc.'s M80/43 has voiced satisfaction with the IBM-compatible CPU's performance during its initial two months of operation.

"Thus far, our M80/43 has been a rock-solid machine," according to Edwin Brownrigg, the University of California's director of library automation. "I understand some other users have experienced problems with their own 43s, but I guess we've just been lucky. Either that, or we must be keeping our computer room real cool."

Brownrigg's comments suggest that the M80/43's much publicized production diffi-

(Continued on Page 2)

• *Aircraft Firm Finds Mark V Cuts Development Backlog*

By Lois Paul
CW Staff

WICHITA, Kan. — Buying applications software packages may not be the only way to relieve in-house development backlog, if the experience of the first user of Informatics, Inc.'s Mark V on-line application generator is any indication.

"Using Mark V, we are developing an in-house personnel system cheaper than any package we could buy, in less time than any package we could buy and installed to our specifications," according to Larry Duntz, assistant manager of computer services for Beech Aircraft Corp. here.

"We had estimated that it would take about three years to program in-house the func-

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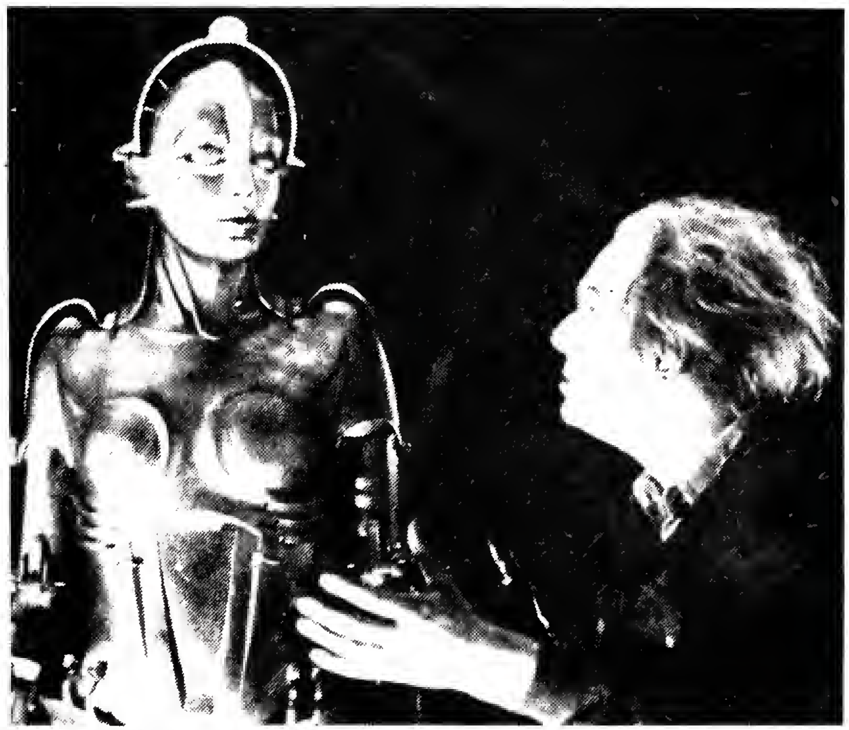

Courtesy Universum Film Aktiengesellschaft; Academy of Motion Picture Arts and Sciences

What's Past Is Prologue

Computerworld **this week concludes its 12-part series on the History of Computing. CW Writer/Analyst Marguerite Zientara takes a glimpse into the future of the technology, examines some possible social effects of that technology and poses some questions — the answers to which only time will tell. See Page 31.**

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Library Checks Out First M80/43

(Continued from Page 1)

culties are finally being overcome. Those problems have seriously impeded Magnuson's efforts to get the processor out the door and have contributed heavily to the vendor's recent financial reverses.

Credited with providing 30% more computing power than IBM's 4341 Model Group 1, the M80/43 lies at the hub of one of the largest book cataloging networks ever installed in the U.S. In essence, the network links an M80/43 and two Magnuson M80/42s with some 100 Ascii CRT terminals that are divided among the University of California's nine statewide campuses.

These on-line terminals afford real-time access to a central, disk-stored data base consisting of bibliographic listings from the main libraries of all nine campuses. The result is that from one terminal, users can peruse library card files electronically, not only on their own campuses, but also on the other eight university locations, Brownrigg said.

Until last Aug. 17, when the network first became available for public use, all six million titles in the university's statewide book collection were cataloged on familiar 3 in. by 5 in. index cards. Since then, an estimated 750,000 titles have been transferred from the card catalogs to 625M-byte IBM 3350-type disk systems, which have been installed here alongside the three Magnuson processors.

By next spring, the total number of disk-stored book titles is expected to double and by 1985, the conversion to a fully automated cataloging system is scheduled to be complete, Brownrigg said.

Main Advantage

One of the main advantages of placing the university's card catalog on-line is that the resulting library network gives users increased flexibility in searching for desired bibliographic entries. "Unlike the traditional card catalog, which allows a topic to be listed only one way, our system uses a 'permuted approach' that enables you to find a needed listing by keying in just about any combination of appropriate subject headings."

The automated bibliographic system also has the advantage of cutting the university's library-oriented clerical costs by eliminating the expensive job of continually updating the nine campus' card catalogs, he said.

Although all three Magnuson processors currently support only 8M bytes of main memory and six channels, each of the machines can accommodate twice as much internal storage and up to 16 channels in a maximum configuration. Within the next few months, each of the mainframes is expected to gain two additional channels as part of the university's effort to enhance its existing library network with a packet-switching capability.

The institution's M80s are supported by the MVT version of IBM's System 360/OS operating system and have been "channel-adapted" to run as a single module under an additional control program known as the Asymmetric Multiprocessing System, Brownrigg said.

Mark V Cuts Firm's Backlog

(Continued from Page 1)

tions under Cobol that we wanted to do in a personnel system. In Mark V, we estimated that same work is going to take about nine months," Duntz continued, noting that the estimates are proving to be accurate. "We are going to have it in production early next year."

The product was announced in September 1981, but Beech Aircraft had served as a Mark V test site since mid-May. The firm had been using Informatics' Mark IV package for several years and had asked to be informed if a product for on-line coding was developed, Duntz said. In April, they were contacted by Informatics about Mark V.

The Beech Aircraft environment includes an IBM 3033 with 12M bytes of memory, he said. At least 36 of the 48 programmers in the computer services group are directly involved with applications using Mark V.

Since 1978, Beech Aircraft has purchased several software products to run under IBM's IMS data base management system and various teleprocessing monitors. "In each case, they were specific application packages and we paid a premium price to get something to do a specific job. Yet, to develop something like those same packages [in-house] would have cost more and taken much longer," Duntz said. The firm purchased the Omega on-line inventory control system from McDonnell Douglas Corp. and a spare parts order entry system from a firm called TLA in Wisconsin, both of which ran under IMS, Duntz continued.

But the company wanted a more generalized software tool "that would allow us to develop packages of our own for our own use with less skilled people and less time," he explained.

The next step was to find or develop an in-house and on-line personnel system to replace an existing batch system and enhance its functions. Under Mark V, a project is currently under way that should put a personnel system into production by January 1982, Duntz said.

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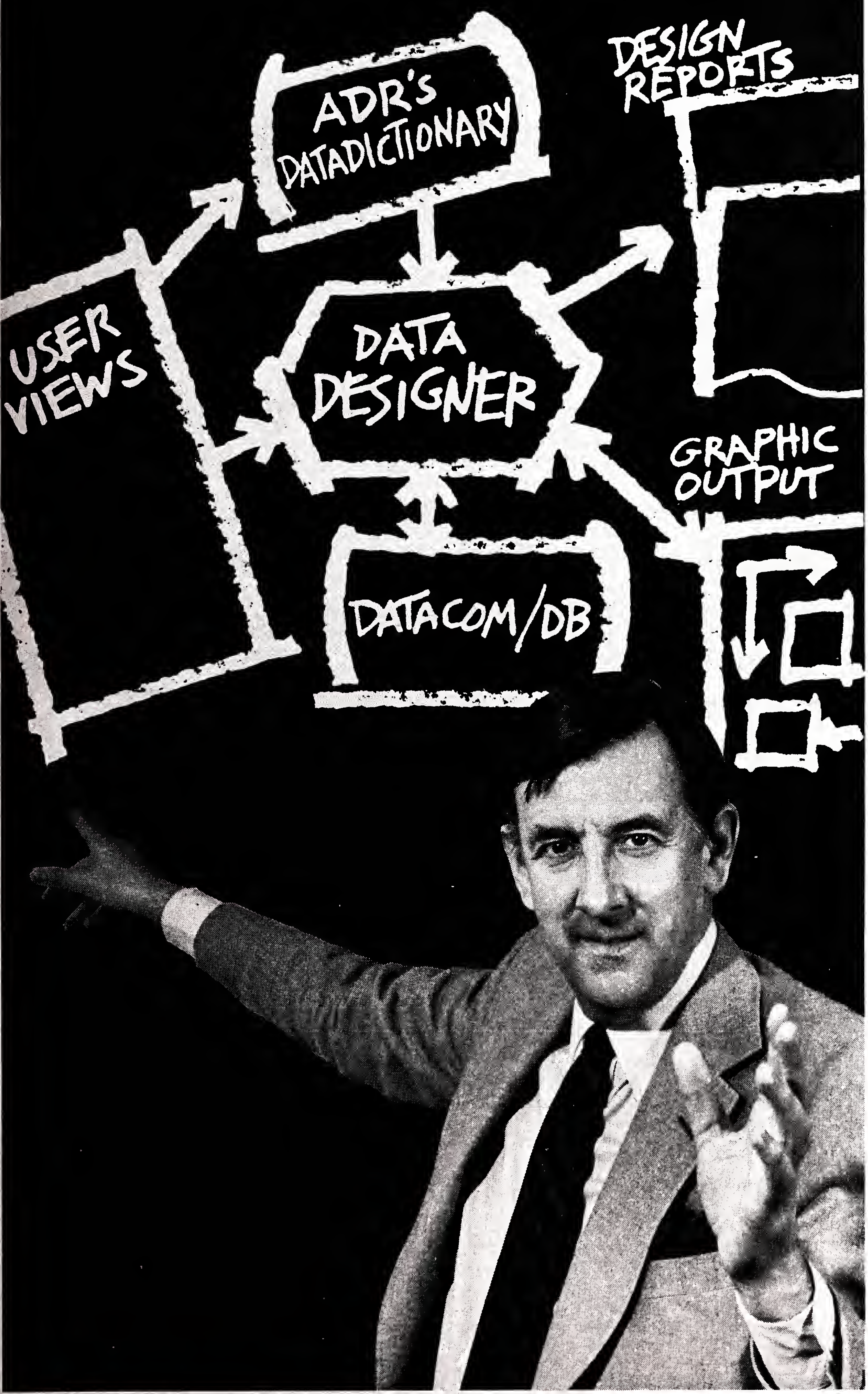

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PDP-11/70s Apparently Do Not Comply

DEC Feels Effects of FCC Radio Frequency Rule

By Tim Scannell
CW Staff

Although the Federal Communications Commission's (FCC) radio frequency ruling has only been in effect about two months, one vendor is already indirectly feeling its impact.

For the past several weeks, there have been rumblings throughout the Digital Equipment Corp. user community that the firm will discontinue its top-of-the-line 16-bit PDP-11/70 computer within the next year or so. A number of users also believe DEC will eventually abandon its low-end 16-bit computer family.

The basis for these rumblings is that DEC's PDP-11/70 and a number of other products apparently violate the FCC's radio frequency guidelines. Users do not think DEC will want to spend the time or money required to bring the 11/70 into compliance with the FCC's emissions rule.

DEC last week admitted that the PDP-11/70 does not presently comply with the FCC ruling, but categorically denied there were any immediate plans to phase out the high-end computer or to turn its back on the 16-bit computer line.

However, DEC did not rule out the possibility that any one or all of its 16-bit machines could eventually become obsolete or be discontinued in the future.

Carl Marbach, editor of the "RSTS Professional" — a 3,500-subscriber newsletter aimed at DEC computer users — said he believes the concerns of the vendor's user community are more than just idle talk.

"It is my understanding that the PDP-11/70 does not meet the current government standards for radio frequency interference ... and will have to stop being produced if it hasn't already," Marbach stated.

Seven Years Old

Besides the inability to meet the FCC guidelines, the PDP-11/70 is close to seven years old, he added, "which is a hell of a long time for a computer to stay in production."

Marbach noted there is even talk of a PDP-11/70 replacement, called the PDP-11/75, and it was described as a "less expensive" version of the firm's PDP-11/44 computer.

A DEC spokesman neither confirmed nor denied knowledge of an "11/75," but instead referred to it as "a logical assumption to make simply because the structure of the 11/44 is very similar to the structure of the 11/70."

Taking a more conservative stand, Adolf F. "Sonny" Monosson, head of the Boston-based American Computer Group and publisher of "Monosson on DEC" — a monthly newsletter — insisted the FCC's ruling would not have much of an impact on current PDP-11/70 users.

Most PDP-11/70s are located in environments where up to 100 11/70s and other computers may be linked into one system. These systems are usually not located where they can cause significant radio interference, Monosson explained.

Shielding Process

In addition, the DEC spokesman claimed that in-house tests show the PDP-11/70's radio frequency signals can be blocked effectively. However, he did not know how extensive the shielding process is or how much it would cost.

Monosson — an old hand at selling DEC computers from his days as head of American Used Computer Corp. — admitted that large users might run into difficulty selling their old and nonconforming PDP-11/70s for state-of-the-art equipment.

"It would have to have some effect on resale value because normally the large machine goes to the smaller user," Monosson said.

"And the smaller user doesn't want any problems."

Honeywell Agrees to Aid Users Meet FCC Regulations on EMI

MINNEAPOLIS — While Honeywell, Inc. did not exactly say that it would pay to correct any electromagnetic interference (EMI) caused by its installed machines, it did say that it would help users track down the source of the problem.

"We will work with our customers and take any appropriate action that would be required by the Federal Communications Commission or any other agency, and that makes good business sense," a spokesman said when contacted last week.

Honeywell's contention is that since a lot of customers use a mixture of equipment that includes Honeywell hardware, another vendor's product could be responsible for excessive amounts of radiation, the spokesman said.

"Given that, we would certainly want to cooperate in an investigation with the user as to the source of the interference," the spokesman observed.

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FCC Ruling Hits Users, Resales

(Continued from Page 1)

machine parts with a special nickel-filled paint that blocks the electromagnetic interference (EMI). However, shielding could be expensive if the machine is a flagrant radio frequency violator, according to Mark Edson, a sales engineer with Chomerics, Inc.'s Radiation Test Services in Woburn, Mass.

The good news, however, is that computer users will not have to modify their systems if the computer's signals are not competing with the local radio station for broadcast air space or unexpectedly opening automatic garage doors.

"We will only concern ourselves . . . if that particular piece of equipment actually causes the interference," the FCC's Garlan explained. "Then some measures will have to be taken to correct the interference."

Bigger Problem

An even greater problem for users, however, lies further on down the road.

Users trying to sell noncompliant computers in order to upgrade to newer equipment may have to modify the machines to meet the FCC rules before putting them on the selling block. At the moment, the FCC is pretty much up in the air as to how it would monitor or enforce such a rule.

"I would hesitate to make an offhand guess as to what our position would be on that," FCC adviser Garlan said. But "we would like to see the equipment brought to compliance before it is sold."

Presently, scores of computer vendors are busily testing their machines to find out if any do not meet the FCC's emission guidelines.

IBM, with one of the largest installed user bases, has reportedly been testing its products since before the rule's inception and is "in complete compliance with all of the FCC requirements," an IBM spokeswoman said.

Honeywell, Inc. is also in the process of testing all of its equipment and reports that, so far, none of its computers or peripherals are in violation.

On the other hand, Digital Equipment Corp. has performed some internal tests on its machines and has found some equipment to be in violation of the FCC rule.

Many vendors have also turned to testing agencies like Chomerics, which not only checks machines for excessive radiation, but recommends how to shield the equipment and provides the data necessary for FCC certification. The firm's basic testing fee is about $750.

Apparently, the radiation testing business is booming. Chomerics reported last week that it is "booked until the end of the year" by vendors that want their equipment tested for excessive emissions.

"All of a sudden they're running around like chickens with their heads cut off trying to figure out what to do," Chomerics' Edson said.

The FCC does not currently require vendors to report on whether their equipment meets its radio frequency requirements. However, it does require that vendors keep the information on file for the agency's review.

Contention-Based

Prolink's Local-Area Net Targets Small Offices

By Bruce Hoard
CW Staff

BOULDER, Colo. — Prolink Corp. here has taken the wraps off a local-area network that is said to provide data and voice transmission for small- to medium-size offices with up to 100 employees.

Proloop is a baseband network running over a coaxial cable loop that connects the network's intelligent, programmable devices, which include workstations, resource management and telephone control units.

Claiming that Proloop offers cost reduction through device sharing, increased flexibility and functionality via shared usage of data files and the elimination of clerical tasks required to transfer data between separate systems, a spokesman explained that network access is based on a contention scheme and features a 10M bit/sec transmission rate. .

Each of the subsystems includes a common control unit (CCU) built around an Intel Corp. 8086 microprocessor with up to 480K bytes of memory, he said. The Procenter workstation, for example, consists of a CCU, bit-map CRT terminal and a separate keyboard.

The resource managers include a CCU, one or more disk drives and a streaming cartridge tape drive. Telephone functions are handled by a CCU and a Prolink Computerized Branch Exchange (PCBX) telephone controller.

The system is not dependent on any one CCU for its processing capability, according to Prolink. If one goes down, it can be replaced with a spare or another CCU from another less critical subsystem. All installation, expansion and reconfiguration of the Prolink network can be accomplished by the customer, the vendor claimed.

Expandable Functionality

The customer can also expand the system's functionality. Initial installation may provide a basic function such as word processing. As needs dictate, new packages, such as DP, telephone management and electronic mail can be added in the form of hardware and software packages.

Proword is the network's WP package, the spokesman explained. It is said to offer advanced display characteristics and reportedly displays text exactly as it will appear in print. In its DP function, Prolink supports the American National Standards Institute's 1974 standard for Cobol and Basic, Prolink noted.

In terms of storage, each storage manager can support up to four disks, each holding a maximum of 35M bytes.

The voice communications function supports a maximum of 30 trunks and 96 telephones, which are served by up to three PCBX-32 telephone controllers.

End-user shipments are schedued to begin April 1 and a typical system is said to cost around $50,000, or approximately $500/workstation, Prolink said from 5757 Central Ave., Boulder, Colo. 80301.

'Top Secret 82' Slated for April

PHOENIX — Honeywell, Inc. will hold "Top Secret 82," its eighth annual national computer security and privacy symposium in Washington, D.C., April 27-28.

The symposium will be chaired by Jerome Lobel, Honeywell's manager of computer security, and will feature more than 20 speakers — many from government agencies — who are national authorities on computer security and privacy. Gerald Dinneen, Honeywell's vice-president of science and technology, will be the keynote speaker.

Two members of Congress, Rep. Glen English of Oklahoma and Rep. William Nelson of Florida, will give luncheon speeches on the subjects of transborder data flow and computer crime legislation.

The registration fee is $450 before Feb. 1 and $525 after that date. A discount of $50/person will apply to multiple registration from the same organization, Honeywell said from M/S T-99-4, P.O. Box 6000, Phoenix, Ariz. 85005.

OCR Meetings Set in Denver

MANCHESTER CENTER, Vt. — The Recognition Technologies Users Association — formerly the Optical Character Recognition (OCR) Users Organization — will hold its winter conference in Denver, Jan. 24-27.

The theme is "How Economics Can Impact OCR Growth." Sessions will feature such topics as OCR in education, business and economics.

The registration fee for members is $280; nonmembers will be charged $350. The association can be reached through P.O. Box 2016, Manchester Center, Vt. 05255.

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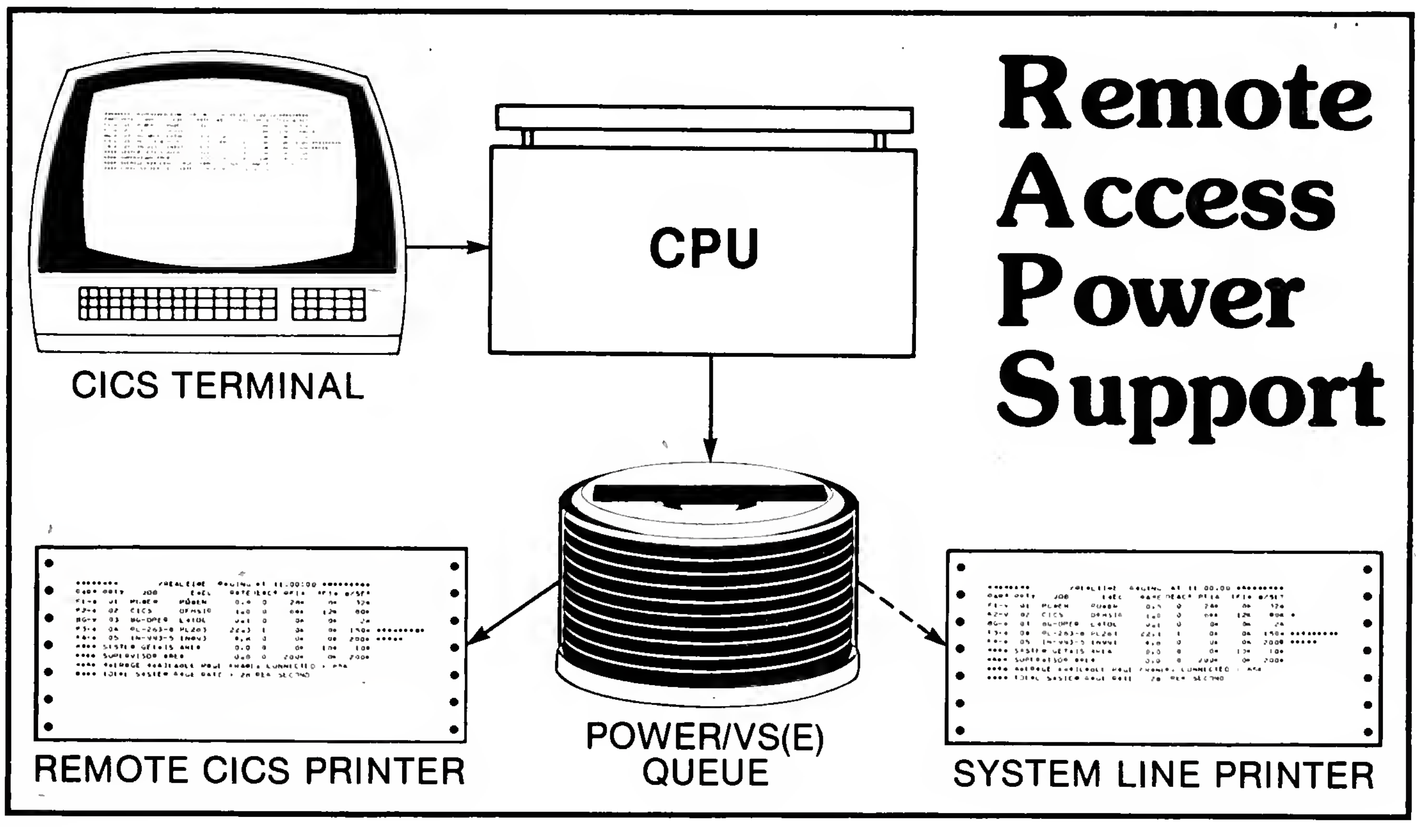

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Multiple Uses of IBM 4300 Muddy Market

By Tom Henkel
CW Staff

The 4300 line of IBM processors was originally designed as mid- to upper range stand-alone processors. But the vendor also chose to develop distributed capabilities for the 4300 series and now acknowledges that occasions arise when both the 8100 and the 4300 can be marketed to the same end user.

And during the past few weeks, IBM made two significant announcements that further blur the intended use of the 4300 machines.

In late October [CW, Nov. 2], IBM announced a Remote Operator Console Facility (ROCF) that allows an operator at a central site to perform manual control functions at a 4300 in a remote location.

A few weeks later [CW, Nov. 16], the vendor introduced a stripped down version of the DOS/VSE operating system, SSX/VSE, that supposedly provides a more user-friendly environment to 4331 and 4321 users.

Major Criticism

One major criticism of 4300 systems in distributed environments was that relatively highly trained personnel were needed to operate the processors. With the introduction of ROCF and the SSX operating system, IBM took a major step toward solving those problems, according to Gerard Hallaren, an analyst with the Boston-based Yankee Group.

The 4300 is basically a reworked version of the 370 line, according to industry analysts. Thus, it can run the voluminous supply of 370-era software and operating systems. In contrast, while the 8100 can interface with 370-type software, it cannot directly use those programs, analysts said.

The newly introduced 4321 processors support SSX/VSE and VM/370 operating systems. Mid-range 4331s support VM/370, SSX/VSE and the native 4300 operating system DOS/VSE. And the top-of-the-line 4341 processors support OS/VS1, DOS/VSE, the Airline Control Program (ACP) and IBM's most complex operating system, MVS/SP.

Jack Hart, an analyst with International Data Corp. (IDC) pointed out that IBM will probably announce support on the 4341-2 for Release 2 of MVS, which operates in a 31-bit address space. That operating system was announced along with a larger version of the 3081 processor in October.

In conjunction with its major reorganization [CW, Oct. 12] IBM divided its product line into big and small systems. The 4341 was the deciding point in that division. All processors at the 4341 level and above were considered to be large systems. Everything below the 4341 level fell into the small systems group. That somewhat unorthodox separation of a processor family may be an indication of IBM's direction in building processors.

"The 4341 is a big boy now," Hallaren said, adding that the distinction between the two systems groups would increase with time.

In the past, users could field up-

(Continued on Page 8)

IBM SYSTEM CHARACTERISTICS	4321	4331-1	4331-11	4331-2	4341-1	4341-10	4341-11	4341-2
Relative Performance[1]	11[4]	11	16.5[4]	22	40	34[4]	50[4]	66
Memory Cycle Time (Nsec)	.20	.20	.29	.40	.70	.64	.90	1.2
Memory Size in Bytes (Minimum to Maximum)	1M	512K-1M	1M-2M	1M-2M	2M-4M	2M-4M	4M-8M	2M-16M
Purchase Price[3] (Memory Size)	$85,000 (1M)	$79,500 (1M)	$109,650 (1M)	$125,000 (1M)	$256,400 (4M)	$178,000 (2M)	$275,000 (2M)	$390,400 (4M)
Monthly Lease (Lease Term)	None	$2,245 (2 Year)	$3,850 (2 Year)	$4,580 (2 Year)	$8,550 (2 Year)	$7,285 (2 Year)	$9,580 (2 Year)	$12,430 (2 Year)
Machine Cycle Time (Nsec)	900[2]	900[2]	900[2]	900[2]	150-300	150-200	120-240	120-240
Channels (Minimum to Maximum)	2	0-2	2	0-2	3-6	3-6	6	6
Cache (Buffer) Size	None	None	4K	None	8K	4K	8K	16K
Bus Architecture?	No	No	No	No	No	No	No	No
Price per 1M Byte Of Main Memory	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000

Notes
1. Supplied by International Data Corp. The 8100 figures are CW estimates based on vendor-supplied information. Relative ratings are based on an IBM 370/158-3 processor equaling 45. These numbers are designed to put the processor into perspective with other systems; it is not a buyer's guide. All systems are not alike; they use different operating systems, instruction sets and architectures and therefore cannot be directly compared. In addition, actual relative performance may vary with the application, peripherals and software.
2. Machine cycle time is 900 nsec per 4 bytes, IBM said.
3. Purchase price is for the processor only. Console, power supply and other prerequisites are not included.
4. CW estimates.

CW Chart

4300 Systems

Loved or Hated: IBM 8100's Stormy Romance With Users

By Tom Henkel
CW Staff

IBM's 8100 is either loved or hated, there is no middle ground.

The processor's proponents told *Computerworld* that the 8100 is misunderstood and maligned, but has the most potential of any processor IBM has ever introduced. Opponents of

(Continued on Page 8)

IBM SYSTEM CHARACTERISTICS	8130	8140A and 8140B	8140C
Relative Performance[1]	12	20	32
Mips[1]	.22	.36	.50
Memory Size in Bytes (Minimum to Maximum)	256K-1M	256K-2M	1M-2M
Purchase Price (Memory Size)	$31,935 (384K)	$83,280 (1M)	$125,450 (2M)
Monthly Lease (Lease Term)	$889 (2-Year)	$2,575 (2-Year)	$3,860 (2-Year)
Machine Cycle Time (Nsec)	1,500	800	800
Channels (Minimum to Maximum)	1	1	1
Cache (Buffer) Size	None	None	None
Bus Architecture?	Yes	Yes	Yes
Price per 1M Byte Of Main Memory	$25,320	$25,320	$25,320

Notes
1. CW estimates.
2. For the processor only; console and other prerequisites not included.
3. Includes processor, storage feature, 128K bytes of main memory and 64K bytes of disk storage.
4. Includes processor, storage feature and 123M bytes of disk storage.

CW Chart

8100 Systems

8100 or 4300? Users Confused

(Continued from Page 1)

2M bytes of main memory.

Some analysts viewed that enhancement as an attempt to beef up the 8100's status as a stand-alone processor — a subject of some controversy among users that have charged that the 8100 lacked the main memory to handle complex stand-alone processing.

Early Snags

The main memory problem was irritated by early snags with the unit's DPPX operating system and Data Management System program generator. IBM revisions of both program products required a larger commitment of main memory from system users.

While the 8100 has been taking on some stand-alone characteristics, the low end of the 4300 line has begun to look more like a distributed processor. About a month ago, IBM announced a central site control feature for remote 4300 processors [CW, Oct. 26].

That announcement was followed by a dramatic shift in marketing policy for the smaller 4300s [CW, Nov. 23]. The newly announced 4321 and 4331-11 processors are available only as preconfigured systems, according to a spokesman.

In addition, IBM announced SSX/VSE — a subset of the native DOS/VSE operating system which lacks DOS/VSE's stand-alone capabilities — with the claim that the new operating system is "more user-friendly" than DOS/VSE.

The 4300 has been criticized for requiring more expertise to operate than many users are willing to devote to a remote site.

Some users maintain that there must be at least one programmer/analyst on site to keep the 4300 running. The enhancements released during the past two months are an attempt to relieve those problems, analysts agreed.

Slow Starter

Neither the 8100 nor the 4300 has fared well in the distributed marketplace, according to industry observers. The 8100 has reportedly been at best a slow seller during its first two years on the market.

And the 4300, while generally viewed as a successful IBM product, has made as poor a showing in the distributed marketplace as the 8100, according to International Data Corp. analyst Will Zachmann.

What are IBM's plans in the distributed marketplace? The current lineup does not seem likely to change in the short term. End users are left with two architecturally different approaches to solving the same problem. It is up to those users to decide which is the best solution for their individual needs.

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- 50% in EXCPs;
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- 24% in Problem State CPU Time (TCB).

2. **The best in programmer productivity.** We never forget that programmers are voters, too. so we've made SyncSort about as "programmer friendly" as a software product can be. We've included these and other features to reduce the "human-intervention" factor:

- INCLUDE/OMIT — chooses records to be sorted.
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The use of these features can reduce the programming time required for a simple application from five programmer days to one programmer day.

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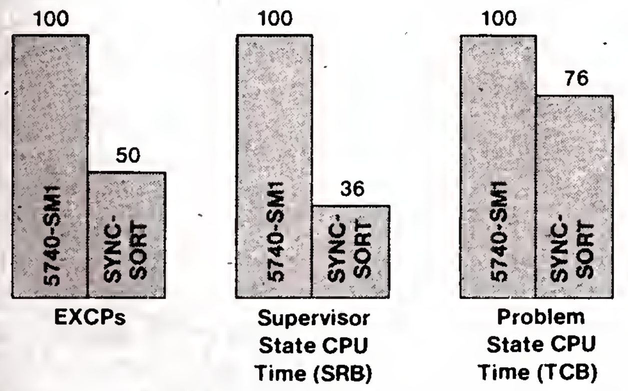

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Loved or Hated: IBM 8100's Stormy Romance

(Continued from Page 6)

the system say it is a disaster.

But pro or con, almost everyone agrees the 8100 will not go down in history as one IBM's greater marketing achievements. The processor was announced in mid-1979 as a new hardware/software combination system. Later that same year, IBM announced the 4300 series — a family of processors that combines higher performance with well-established 370-era software.

The combination of the 4300 introduction and start-up software problems with the 8100 turned some users against the 8100 system. Sales have been less than impressive, according to industry analysts. In addition, some users have argued that the system does not offer enough main memory to be used as a stand-alone processor.

Stand-Alone Usage

The 8100 was designed and announced as a distributed processor, according to IBM. However, some stand-alone usage has evolved over the last 18 months and both types of applications are supported.

The 8100 line is supposedly aimed at vendors like Datapoint Corp. and Perkin-Elmer Corp., according to Will Zachmann, an analyst with International Data Corp. (IDC). Zachmann maintains that these competitors are outselling IBM in the distributed marketplace. The 8100 has not made much of a dent in that market, according to the IDC spokesman.

But the 8100 may eventually replace the 4300 as the pathway to IBM's top-of-the-line 3081, according to Zachmann. Others speculate that the technology employed in the 8100 is an indication of how larger IBM systems will look in the future.

Bill Ackerman, president of DPX, Inc., a Cupertino, Calif.-based consulting firm specializing in 8100 systems, listed 8100 selling points:

- The ability to control a network of 8100 processors from a central site.
- Compatibility with IBM's System Network Architecture, which is reportedly more extensive than the compatibility offered by the 4300 series.
- The availability of an applications development tool, called Data Management System, which functions as a program generator to convert user input to a specialized IBM high-level language. Customers are "crazy about" the package, which reportedly allows reasonably untrained users to create programs, according to Ackerman.

Easy Installation

The 8100 system is also very easy to install and operate, according to some users. In one installation, 8100 processors were delivered to remote sites and users without formalized computer training were able to set the units up and start processing in a matter of hours.

The 8100 is a departure from traditional IBM architecture where data is stored in a linear fashion and contained within a homogeneous memory space. Instead, the processor is designed for simplicity, according to IDC. Many of the hardware functions on larger IBM systems are rooted in operating systems on the 8100.

Two system choices are offered to the 8100 user: DPPX, an operating system designed for distributed applications, and DPCX, a simpler operating system for stand-alone operation.

IBM has invested as much time and money in developing those two operating systems as it did for the 360 series operating systems, Zachmann explained. The 360 software became the basis of IBM's current vast array of program products, the analyst noted.

A 32-bit address space is employed on the 8100, according to IDC. IBM has used a 32-bit address space on its processors for some time. However, only with the advent of the 3081 did the vendor break away from its tradition of offering 24-bit addressing to make available 31 bits of addressable storage.

In the future, Zachmann contended, IBM's large-systems product line will come in just two forms — the 3081 for mainframe processing and the 8100 for distributed applications. Others predict IBM will also offer 31-bit addressing on the upper end of the 4300 processor family.

IBM Muddies 4300 Market

(Continued from Page 6)

grade within product lines, but could not field upgrade from a 4331 to a 4341 processor. When IBM announced the 4321 (a processor some analysts maintain is essentially a renamed 4331-1) IBM broke that tradition. But both Hart and Hallaren agree that the break probably will not carry over to the 4341 machine.

The 4321 and three 4331 models (the 4331-1 will be dropped from new production in February 1982) pose the greatest competition for the 8100 line.

IDC's Will Zachmann maintained that the 4300 has never been a hot seller in distributed environments and contended that 4300s in general have not lived up to IBM's sales objectives.

But the 8100 processor is also described as less than successful in the distributed marketplace by those industry observers who remain unimpressed by that hardware line.

IPL Challenges IBM 4300 With New CPU, Price Cuts

WALTHAM, Mass. — In a swift reaction to IBM's 4300 announcement last week, IPL Systems, Inc. here introduced a new IBM-compatible processor while upgrading performance and reducing prices on its other systems.

IPL's new 4445 complements the company's 4400 line and is designed to compete with IBM's 4341 Model Group 11, Ron Bleakney, IPL vice-president of sales, noted. The system has a maximum main memory capacity of 8M bytes. Depending on the configuration, the system is priced from $228,335 to $325,000, he explained.

IPL also reduced prices on the three other models in the 4400 series.

- The IPL 4436, which the company claims is 50% faster than IBM's 4331 Model Group 2, is repriced to a minimum of $140,000. Previous prices ranged from $165,000 to $215,000, depending on the configuration.

Moreover, the firm expanded the memory capacity of the machine from 4M bytes to 8M bytes.

- The IPL 4443, which the company claims is now up to 30% faster than the new IBM 4341 Model Group 10, was repriced at $182,765 to $295,000. Previous prices were from $220,000 to $320,000.
- The firm's 4446, which competes with IBM's 4341 Group 2, is now priced at $289,965 to $510,000. Previous prices were from $325,000 to $425,000.

In addition, IPL expanded the memory capacity on its 4446 from 8M bytes to 12M- to 16M bytes.

Quantity Discounts

IPL also announced a quantity discount policy for its systems. Users who order four to nine machines will receive a 6% discount from the list price. For orders of 10 or more systems, IPL is offering a 10% discount, Bleakney said.

Bleakney claimed that users wishing to upgrade from an IBM 4341 Model Group 10 to a Model Group 11 would have to pay $97,000 for the upgrade, whereas with the new IPL 4445 the same upgrade would cost $45,000. All IPL systems are field-upgradable, the firm stated. By comparison, an IBM user with a high-end 4331 system has to change machines to get into the 4341 world, according to Bleakney.

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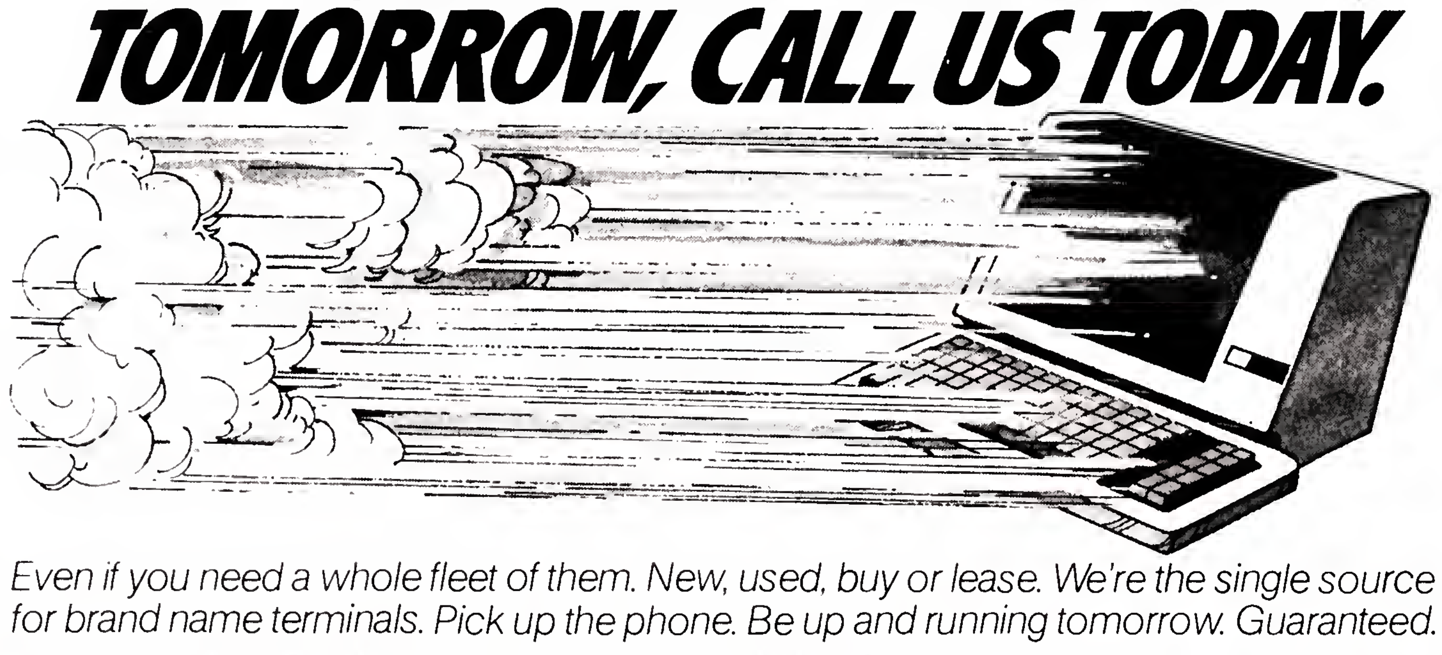

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White Paper Out On DP Management

BETHESDA, Md. — Gary Slaughter Corp. is offering a free white paper entitled, "Manager's Role in Improved DP People Communications, Motivation and Management."

The 23-page paper discusses a new DP management approach to managing DP people.

The paper is available from the firm at 4810 Montgomery Lane, Bethesda, Md. 20814.

NBS: Federal DP Inventory to Double by '85

(Continued from Page 1)

General-purpose terminals are expected to increase from a 1979 installed base of 188,500 ($694.3 million) to 844,933 ($2.88 billion) in 1985, with CRT terminals increasing from about 58% to about 72% of the total. The number of printers — both impact and nonimpact — is expected to increase by nearly 150,000, from the 1979 installed base of 54,319 ($367.3 million) to 202,300 ($2 billion) in 1985.

The number of floppy disk drives in government use should increase dramatically over the next five years, NBS said, with another two million floppies in use by 1985. Of the four types of floppy disk drives, the 8-in. two-sided floppy disk drive is expected to be the most popular. Rigid disks will increase from 176,790 ($901.6 million) in 1979 to 215,110 ($1.1 billion) in 1985.

The number of auxiliary storage devices is not projected to increase substantially during the five-year period, but add-on core memory will increase significantly from the 1979 installed base of 2,730M bytes, costing about $108.6 million, to 7,005M bytes, estimated at $202.4 million in 1985. Much of that increase is attributable to minicomputer add-on core of 4,860M bytes by 1985, NBS said.

In 1979, the dollar value of all federal storage media was $111.2 million, divided, according to NBS, among magnetic tape reels (57%), floppy disks (17%), rigid disks (17%) and digital cassettes and cartridges (8% combined). By 1985, the projected dollar value for all storage media in federal use will be $234.4 million, with the percentage of magnetic tape declining to 47%, floppy disks to 13%, rigid disks increasing slightly to 18% and digital cassettes and cartridges increasing to 13% and 8%, respectively.

Other NBS findings on federal DP use included:

- Over 50% of federal installations were using Cobol as the principal programming language in 1979; by 1985 that figure should exceed 60%.

"This continued growth reflects the reality that the largest stock of programmers are familiar with Cobol and that a major portion of current applications software is written in Cobol," NBS noted. "Even if more sophisticated and user-friendly software is developed during the next five years, vendors will face a difficult marketing task in educating users, programmers and systems managers to new technologies."

- The federal government spent approximately $559 million on software in 1979, with $116.9 million (21%) going for systems software, $66 million (12%) allocated to utility software and $376.2 million spent on applications software. For systems software, 53% of these expenditures were for internally developed software. Fifty percent of the money allocated to utility software went for internally developed software as did 83% of the dollars spent for applications software.

"It appears that the degree of customization for applications software is much greater in the federal government than in the United States as a whole," the report said.

- In 30 federal installations studied for the report, an average of more than 2,000 computer programs were installed in each. The average size of programs installed was estimated to be 2,070 lines of code. Programming languages most used at those sites, in descending order of importance, were Cobol, Fortran, PL/I and Basic.

Analysis of the average software program life cycle in those selected sites indicated over 33% of the total time spent was for requirement study and preliminary design, approximately 47% for detailed design and coding and 20% for testing and debugging. The average dollar amount spent for this program life cycle was more than $43,000.

The NBS report, "An Assessment and Forecast of ADP in the Federal Government," is based on research conducted by International Data Corp.

The report (NBS SP 500-79) is available for $5.50 from the U.S. Government Printing Office, Washington, D.C. 20402.

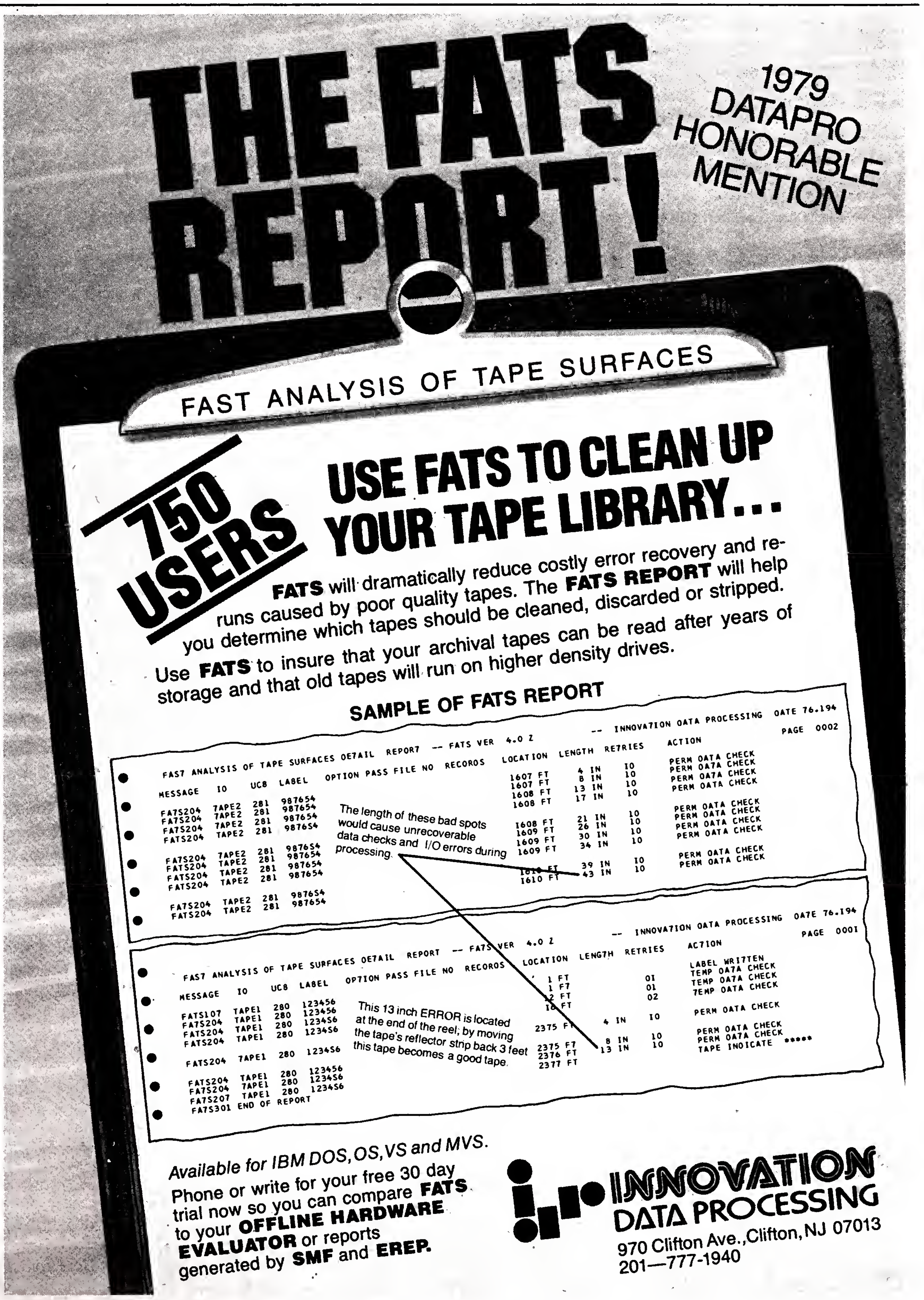
IEEE Slates Tutorial Week

ORLANDO, Fla. — The Institute of Electrical and Electronics Engineers (IEEE) Computer Society will present a week of tutorials here March 22-26 in parallel with the 1982 IEEE Southcon show.

Organized around 15 individual one-day courses, "Tutorial Week East" has three subject tracks covering topics of interest to computer scientists, programmers and software engineers and designers; hardware, microprocessors and graphics; software engineering; and distributed computing and networks.

Individuals may take up to five tutorials for the full-week registration fee of $400 for IEEE and IEEE-Computer Society members, or $500 for nonmembers. Registration fees for individual tutorials are $90 for IEEE members and $110 for nonmembers.

The IEEE Computer Society can be reached through P.O. Box 639, Silver Spring, Md. 20901.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MESSAGE   IO     UCB  LABEL   OPTION PASS FILE NO  RECORDS   LOCATION  LENGTH  RETRIES   ACTION
FATS204   TAPE2  281  987654                                 1607 FT    4 IN     10      PERM DATA CHECK
FATS204   TAPE2  281  987654                                 1607 FT    8 IN     10      PERM DATA CHECK
FATS204   TAPE2  281  987654                                 1608 FT   13 IN     10      PERM DATA CHECK
FATS204   TAPE2  281  987654                                 1608 FT   17 IN     10      PERM DATA CHECK

FATS204   TAPE2  281  987654                                 1608 FT   21 IN     10      PERM DATA CHECK
FATS204   TAPE2  281  987654                                 1609 FT   26 IN     10      PERM DATA CHECK
FATS204   TAPE2  281  987654                                 1609 FT   30 IN     10      PERM DATA CHECK
FATS204   TAPE2  281  987654                                 1609 FT   34 IN     10      PERM DATA CHECK

FATS204   TAPE2  281  987654                                 1610 FT   39 IN     10      PERM DATA CHECK
FATS204   TAPE2  281  987654                                 1610 FT   43 IN     10      PERM DATA CHECK
```

The length of these bad spots would cause unrecoverable data checks and I/O errors during processing.

```
                                                                       -- INNOVATION DATA PROCESSING  DATE 76.194
FAST ANALYSIS OF TAPE SURFACES DETAIL  REPORT  -- FATS VER  4.0 Z                                   PAGE  0001
MESSAGE   IO     UCB  LABEL   OPTION PASS FILE NO  RECORDS   LOCATION  LENGTH  RETRIES   ACTION
                                                                                         LABEL WRITTEN
FATS107   TAPE1  280  123456                                    1 FT             01      TEMP DATA CHECK
FATS204   TAPE1  280  123456                                    1 FT             01      TEMP DATA CHECK
FATS204   TAPE1  280  123456                                    2 FT             02      TEMP DATA CHECK
FATS204   TAPE1  280  123456                                   16 FT
                                                             2375 FT    4 IN     10      PERM DATA CHECK
FATS204   TAPE1  280  123456
                                                             2375 FT    8 IN     10      PERM DATA CHECK
FATS204   TAPE1  280  123456                                 2376 FT   13 IN     10      PERM DATA CHECK
FATS204   TAPE1  280  123456                                 2377 FT                     TAPE INDICATE *****
FATS207   TAPE1  280  123456
FATS301 END OF REPORT
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SBS, Tymnet Experimental Net Bypasses Bell

By Phil Hirsch
CW Washington Bureau

NEW YORK — Data communications users may soon be offered an alternative to telephone company-provided local loops, officials of Satellite Business Systems (SBS) and Tymnet, Inc., said here last week.

They spoke at a press conference marking completion of a transcontinental data communications experiment that used an SBS satellite channel attached to microwave and cable TV local distribution facilities. Data was transmitted end to end at up to 1.5M bit/sec between New York and San Francisco.

In addition to bypassing the telephone network, the demonstration also reportedly showed that competitors of AT&T can build a system capable of providing marketable communications services. In addition to Tymnet and SBS, Local Digital Distribution Co. (LDD), Manhattan Cable Co. and Viacom, Inc. were major sponsors for the demonstration.

Several participating users transmitted live data back and forth between New York and San Francisco at speeds up to 56K bit/sec. These included Control Data Corp.; Merrill, Lynch, Pierce, Fenner and Smith; ITT World Communications Corp.; RCA Americom; and Wells Fargo Bank.

Aside from higher transmission rates, the users also obtained "100 to 100,000" times more reliable service than is provided by the telephone network, according to LDD President John Puente. Error rates of $1:10^{-8}$, often reaching $1:10^{-11}$, were achieved, he said.

FCC Approval

The Federal Communications Commission (FCC) must approve one or more of the digital termination service (DTS) applications filed by SBS, Tymnet and seven other applicants before the new technology can be marketed. SBS President Robert Hall "guessed" the commission would approve the first system in the first quarter of next year.

Hall pointed out that some regulatory issues have to be resolved first and maintained that this may cause some delays. One problem is that nine applicants are contending for the seven channels set aside by the FCC for digital termination services.

Significantly, however, the main obstacle to commercial implementation of DTS appears to be regulatory rather than economic.

According to Hall, the demonstration has shown that high-speed data transmission, end to end, via satellite intercity facilities and microwave/cable TV local links, is "cost-effective." He explained that his statement is based on a cost extrapolation — that is, it would cost less to provide high bit rates over DTS facilities than over digital local channels leased from the telephone company. Therefore, the charge to the user would be lower.

The test, according to Tymnet President Bob Harcharik, indicates that "in general, we can provide digital service, end to end, at 256K bit/sec for about what the user is now paying for 9,600 bit/sec service."

Customer Base

Most of the DTS applicants already have a customer base whose traffic can be transferred from telephone to DTS facilities. What these companies save in payments at AT&T would go a long way toward recouping their DTS investment. But there is more to it than that.

As Tymnet's Bob Harcharik put it: "Our present customers include many of the nation's largest corporations. These are users who already have a requirement for digital data transmission at speeds above 56K bit/sec. Once we can meet that requirement end to end, we expect to do a much bigger business with these customers. And as they exploit the capabilities of DTS, other users will be encouraged to do likewise.

"As the DTS user base grows, it will broaden the market for high-speed digital facsimile, teleconferencing systems and similar devices requiring broadband transmission capability. The result, based on past history, should be to make these applications more economical, which, in turn, should attract more users. With the new local-distribution technology, we will be able to move facsimile pages and teleconferencing as economically as we can move data key-strokes today," he said.

Encourage Development

Another possible result of the recent demonstration will be to encourage development of alternate networking schemes. Tymnet, for example, connected some users participating in the trial with AT&T terrestrial facilities, as well as with the SBS satellite channel.

LDD has developed a local-area network compatible with its Rapac (microwave) and Capac (cable) digital termination systems. And SBS President Hall said "we are looking at ways to interconnect our satellite system with high-speed local networking facilities." Network Systems Corp.'s Hyperchannel system was mentioned specifically. SBS, Hall said, "is procuring a prototype adapter from Network Systems Corp. that would make it possible to link distant Hyperchannel installations over the SBS satellite system."

Facilities Used

The facilities used in the recent demonstration consisted of an SBS channel transmitting 1.5M bit/sec full duplex between New York and San Francisco, plus a central node in each city connected by microwave to the earth station. In New York, this node communicated with the subscriber via the Manhattan Cable TV network; in San Francisco, microwave channels served some users while cable TV channels, provided by Viacom, served the others.

Within each central node was a communications processor, supplied by Tymnet, that performed protocol conversion.

IMC Offers Audiovisual Kit

WASHINGTON, D.C — The International Micrographic Congress (IMC) is offering an audiovisual presentation given at its recent conference in Mexico City by Dr. Leo J. Thomas, senior vice-president and director of Research Laboratories at Eastman Kodak Co.

Thomas addressed the conference on "Emerging Technologies for the Information Industry."

The printed script and 100 color slides are available for $80 from IMC, P.O. Box 34404, Bethesda, Md. 20817.

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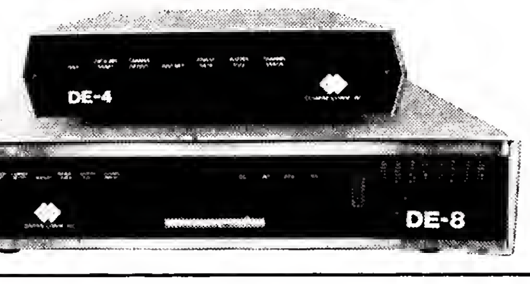

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Goals Met in Structured Methodology Switch

By Rita Shoor
CW Staff

ST. PETERSBURG, Fla. — Why would a 15-person development staff already caught between the rock of fighting fires on production systems and the hard place of developing new application systems make a group commitment to an entirely new way of doing things?

There were two reasons for the decision to adopt structured program development standards in mid-1978, according to John E. Bennett, supervisor of the System Development Group at the Times Publishing Co. here.

The first was a need to come up with more accurate calendar time estimates for completing a given programming, design or analysis assignment. "We wanted to establish reasonable milestones" for system development tasks, he said.

Second, Times technical staffers wanted to "make our lives easier" as a group, he observed.

After more than two years, it appears that both goals have, in large measure, been met. Project estimating has improved to where the staff "can hit target dates within plus or minus 10%," he said. While the technicians "never really told" other department heads exactly how they were developing the new, more accurate estimates, Times end users are quite comfortable with the results, he said.

Structured techniques have also contributed to the second objective. For example, strict adherence to a standard that limits subroutine length to about 50 lines of code, and only allows downward branches to a point visible upon that subroutine page, freed programmers from searching through a program listing for control transfer points, Bennett explained.

The new design standards are credited with making 3,000 staff-hours normally used in program repair available for new applications development, based upon statistics kept during a 12-month period ending in April 1980.

Group satisfaction has also improved because programmers began to feel they could talk to each other about their work rather than keeping things to themselves. Although there was initially some resistance to code reviews for conformity to existing structured guidelines, a sense of sharing has ultimately developed, Bennett said. Everyone learned that "we all did some things wrong and some things right."

Presenting the Program

Increased programmer productivity and satisfaction, happier end users and standardized efficient Cobol programs all sound good. But "the first 18 months are not easy," Bennett cautioned.

The relatively few problems with staff resistance to structured techniques can probably be traced to several factors. The systems staff was encouraged to look upon the entire process as a learning experience rather than as a mandated change, he recalled. "If you present it [structured methodology] to a group of people as a super technique developed in a think tank," there will be a negative reaction, he maintained. So, he presented the structured standards as "something that could be modified by them" if they could provide an acceptable reason for the change. A forum was provided for discussions via weekly meetings of the entire group with Bennett acting as moderator.

"Concentrate on the people involved rather than the mechanics of the technique," he said, offering a strong recommendation for Gerald Weinberg's *Psychology of Computer Programming* as a beginning reference work for the information systems director who is thinking about going the structured route. He advocated encouraging staff members to read about the approach at their own pace. "In quiet moments at home, they can start accepting it."

Bennett stressed that he could only draw upon his own experience with these recommendations. Group personalities vary at different shops, he pointed out.

Again, emphasizing the personal aspects of successfully implementing structured methodology, he indicated that "in many ways, a specific technique is immaterial to the fact that everyone agrees to use it."

Finally, he suggested selecting programmers that are "hot on the technique" to ensure that the first system implementation goes well.

After conceptualizing the initial approach, Bennett prepared a 12-week internal training course on basic structured concepts. The programming and analysis staff participated in the course and tried things out over a six-month period. This try-out period was essential to the success of the implementation, Bennett noted.

Staff Agrees: Standards Work Well in Real World

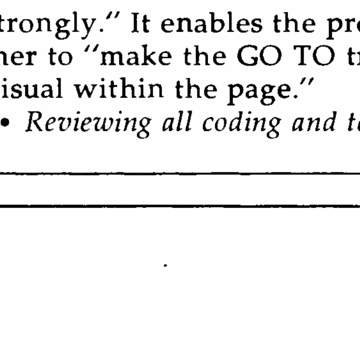
The Times Publishing Co. decision to implement structured methodologies was based on a commitment from every technical staff member to accept a standardized design approach and identical formatting techniques in Cobol programs. After six months in the real world, the staff consensus was that the following standards worked well in the Times environment:

- *Use of data flow diagrams in initially describing systems.* Process bubbles with data flowing out of them, described in *Structured Analysis and System Specification* by Tom DeMarco, were selected for this standard because they are free-form, and John Bennett, supervisor of the computer systems development group with Times, "wanted to free people from the flowcharting template."
- *Preparation of visual table of contents charts before anyone enters a line of program code.* Attributing the basis for this technique to Edward Yourdon of Yourdon, Inc., Bennett's group actually used *Structured Programming* by Michael Murach as the backup for this particular standard. Programmers or analysts draw a chart of the module hierarchy within a program including module name and a brief description. This is very helpful when the program is being maintained at a later date, he said.
- *Top-down testing of both programs and systems.* Bennett's staff used Yourdon's *Technique of Structured Programming and Design* for this standard. One practice implemented from this book was to put together any necessary executive command statements before a program is written. EC language is Honeywell, Inc.'s designation for what is referred to as JCL in other systems environments, he explained. All files are identified in the EC statements and these become a "test harness" into which the program is eventually inserted for testing.
- *Developing all programs from a library skeleton.* Each programmer extracts a copy of this very basic program and then builds his specific logic on it, Bennett said.
- *Limiting subroutine length to about 50 lines of code and eliminating absolute branches.* Basing the subroutine length upon a Yourdon recommendation, Bennett stated that he believes in the limit "very strongly." It enables the programmer to "make the GO TO transfer visual within the page."
- *Reviewing all coding and test iterations for conformity to existing guidelines.* This is usually done by the appropriate project leader. If that person is not available, another programming supervisor or Bennett himself takes over this review. Some people objected to this standard when it was first implemented, he admitted.

Individuals who were feeling deadline pressures occasionally bypassed this step. But, as it became apparent that avoiding the review could result in later problems with the program or system, the tendency diminished. "You have to develop your own cookbook" for selecting and enforcing these kinds of standards, Bennett observed.

- *Avoiding nested IF statements with the exception of Cobol's ELSE IF simulation of case structure.* Despite being in its third year as a structured group, Times staff members are still taking this position. While a "very adroit" programmer can work his way through complex nested IF logic, the staff agreed that nesting IF statements created too great a probability for confusion when used by less experienced programmers.

In general, if something is not clear and simple, we tend to avoid it, Bennett summarized.



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ABA Polls Banks on Critical Issues in Industry

WASHINGTON, D.C. — Banking regulations, Federal Reserve Bank pricing and productivity were the critical operational issues facing the banking industry, according to the American Bankers Association's (ABA) 1981 National Operations and Automation Survey.

The price tag for compliance with the Federal Reserve's Regulation E, which governs electronic funds transfer, averaged more than $5,000 monthly for large banks, $740 for medium-size banks and $158 for small banks.

The survey defined large banks as those having more than $500 million in assets, medium-size banks as those with assets between $100 million and $500 million and small banks as those having assets of less than $100 million.

Moreover, all 848 bankers surveyed believed check processing costs would be higher as a result of the Federal Reserve pricing of services. However, the annual price increase predicted varied by bank size. Small banks anticipated increases of about 3% annually, while medium-size banks projected an 18% price hike and large banks expected a 25% pricing increase, which would result in at least a $500,000 annual increase in check processing costs.

Productivity Inadequacy

More than 50% of the bankers surveyed said productivity was not being addressed adequately by the banking industry. To alleviate that inadequacy, 29% of the large banks noted they have appointed productivity officers.

In terms of spending, the survey found that the annual expenditure for computer equipment was $39,000 for small banks, $200,000 for medium-size banks and nearly $2 million for large banks. All banks responded that they expected their computer equipment expenditures to rise between 22% and 28% during the next two years.

Annual software expenditures averaged $11,000 for smaller banks, $24,000 for medium-size banks and $180,000 for large banks.

Data processing salaries represented a large expense for all of the banks surveyed, which accounted for more than 40% of total U.S. bank assets. Large banks spent about $1.2 million annually for DP salaries while medium-size banks spent about $109,000 and smaller banks spent about $39,000.

As for services the banks reported the most, the two most popular were automated clearing house debits (55% of responses) and account reconciliation (44% of responses).

Although an overwhelming majority of the banks surveyed said the banking industry was going in the right direction with check safekeeping, the percentage of banks offering this service ranged from 3% for small banks to 19% for large banks.

ATM Fraud in 40%

During 1980, 74% of the large banks, 52% of the medium-size banks and 14% of the small banks had automated teller machines (ATM) in place. However, 40% of those banks with ATMs said they had experienced ATM fraud at some time, with the average loss ranging from $400 to $13,000, depending on the size of the bank.

The banks surveyed indicated they had increased the use of shared ATM facilities. Between 54% and 61% of the banks responding said they currently share or are planning to share ATMs.

Besides ATM services, 40% of the banks said they now use or plan to use on-line teller systems for applications such as balance inquiries, check cashing, deposit acceptance and loan payments.

Copies of the survey are available for $125 to ABA members and $200 to nonmembers. Subsequent copies are priced at $60 and $140, respectively.

The survey can be ordered through the Order Processing Department of the ABA at 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

Drucker to Speak At Feb.4-5 Meet

ARLINGTON HEIGHTS, Ill. — Management consultant Dr. Peter F. Drucker will speak at a two-day workshop/seminar sponsored by Advanced Systems, Inc. entitled "The Productivity and Performance Crisis."

The gathering will be held in Palm Springs, Calif., Feb. 4-5 and was designed to address the key issues in managing and constructing productivity improvement programs, the firm said.

Drucker will address three sessions: "Managing Yourself for Greater Productivity," "Increasing the Productivity of the Knowledge Worker," and "The Japanese Approach to Productivity — Opportunities and Pitfalls."

The registration fee is $595 per person for those who did not attend last year's conference and $500 for anyone from a company that was represented last year.

There is also a $60 discount for anyone registering before Jan. 1, the firm said from 2340 S. Arlington Heights Road, Arlington Heights, Ill. 60005.

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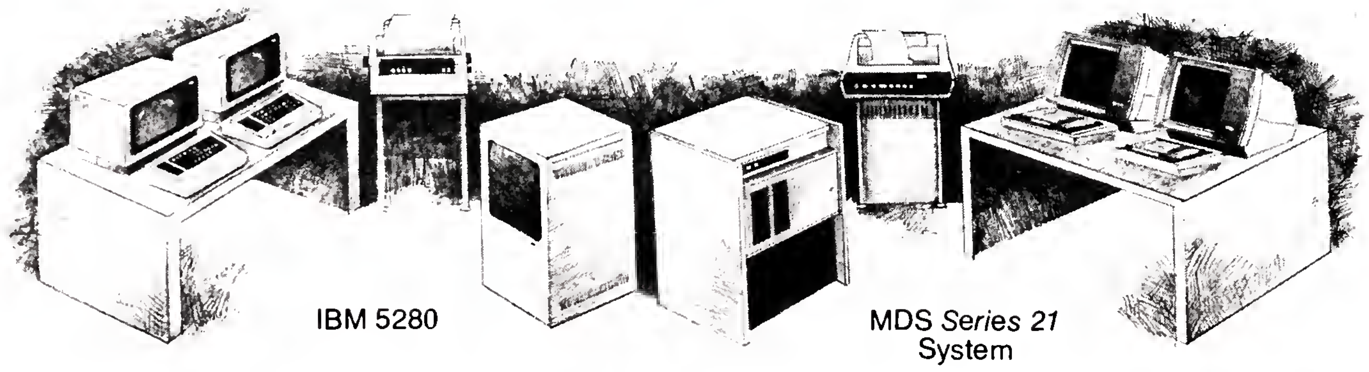

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Misuse of Data Cited

Execs Surveyed Say DP Operations Inefficient

By Bruce Hoard
CW Staff

HOLYOKE, Mass. — A recent survey conducted by the Dennison National Co. here found more than 70% of the DP managers and 50% of the operating managers contacted felt their companies are not using computers as efficiently as possible.

In the telephone survey, 22 line managers and 38 DP managers from 52 major U.S. corporations were asked to evaluate the efficiency of their computer operations and the potential of computers in improving the productivity of top-level senior executives.

Respondents complained that computer-generated data is generally used in tactical as opposed to strategic decision making. The feeling that the computer is not used efficiently in strategic decision making is "more true than I'd like to admit," said one senior DP vice-president of a national mutual insurance company.

"We as an industry have a long way to go before we can take the variety of data available and condense it into effective reports for senior management decisions," he added. "The volumes of data we now supply fall short of providing top-level managers with the information they need."

The survey indicated widespread doubt exists that, even with the right kind of information, strategic decision making will always be financially cost-effective. "Right now, an executive typically can't make a cost-effective decision using an on-line system," the DP manager of a U.S. automobile manufacturer commented. "The CRT sits in an office and costs around $160 a month to operate. It simply isn't used enough."

Along those lines, the manager of management information for a large truck trailer manufacturer said he "had my CRT taken out of my office because I just don't use it that much."

Inherent Weaknesses

The consensus among many DP managers and operating executives is that even on-line systems still have inherent weaknesses that make them more suitable for tactical or "bread and butter" decisions than for true executive strategic decision making.

"Computer-generated data is primarily used for operational systems, for bread and butter activity," the DP manager of a major steel company said. "It is not used beyond the clerical level."

One of the major roadblocks to the use of computers in strategic decision making is the format in which the information is presented.

According to the management information systems director of a national manufacturing company, information must be presented in "the way executives need — more summarized, yet more wide ranging than most computers are programmed for.

"Executives have ad hoc questions to ask in order to make decisions. These tools don't exist yet."

The inefficient use of computers can actually have a negative effect on productivity, the survey found. Computers produce, on a daily basis, volumes of wasted data that is too detailed, irrelevant or obsolete. The problem becomes one of raw data vs. digested information.

The physical handling of computer information presents another obstacle to computers' timely and effective use. Hard copy must be circulated and some method must be developed for storing it.

The level of expertise of managers and senior executives plays a major part in the limitations placed on the computer's potential for improving white-collar productivity in the office. "Executives are afraid to use computers and demonstrate their ignorance," one DP manager said. "There is an absolute need for better background in computers among corporate-level executives," the vice-president of a large life insurance company added.

A senior systems analyst for a national insurance company summed up the lack of efficient computer use: "The way computers are used now is like using the space shuttle for suburban milk deliveries."

The eight-page survey is free of charge from Dennison at 1 Water St., Holyoke, Mass. 01040.

DP Careers for Women Covered at WIP Forum

By Bob Johnson
CW New York Bureau

NEW YORK — "There are a number of DP jobs available in the computer industry and if women get only a quarter of them, it is going to be a lot."

So said Connie Winkler, a computer journalist and media consultant, at the inaugural meeting of the New York Forum of Women in Information Processing (WIP) here last week.

Winkler kicked off her talk on career strategies for women in the computer field by sharing her past experiences as an employee at IBM. "Different things happen to women trying to rise in management than to men," Winkler stated. She said that women who began their careers at IBM in the 1960s usually started as "systems engineers," which in reality only amounted to being a "helpmate," or in holding hands with a client.

"All companies make claims about how women are progressing, but they have a long way to go," she said.

As a positive example, Winkler noted the case history of an ex-IBM systems engineer who was chairman of the board at NBC. Jayne Cahill Pfeiffer, Winkler said, started as a systems engineer at IBM and eventually moved up to a staff position of vice-president of communications at that company. She noted however, that there has not been a woman at the vice-president level of IBM since 1976.

Winkler stressed that women aspiring to management levels within DP should seek out their peers at other companies and compare notes. She said that women DPers should ask other women in the field how they got where they are and how they are doing. Winkler also advised that women DPers should ask about salaries, because it is a good way to tell if you are being treated fairly in the market.

Lack of Research

One problem Winkler noted was that there has not been a lot of research done in the area of women in information processing. "The reason that there hasn't been is probably because the subject is not taken that seriously," she said. She did cite one study, however, done by Anita Cochran of AT&T in 1974. Winkler said that the study found that 22% of the scientific and engineering jobs in the computer field are held by women. This, coupled with the number of women software engineers in the field, makes women the largest money-making group in DP, Winkler said.

She continued, however, by saying that the study revealed that the greatest number of women working with computers are in data entry or keypunch and that "Ninety-five percent of the managers in these areas are men." The study also revealed, according to Winkler, that men in the computer field are paid more on the average than women.

On the optimistic side, Winkler pointed out that according to the National Science Foundation, the traditional barriers of employment fall when there is a shortage of needed skills. "I think this was the case in the late '60s and these skills are still in demand," she said.

Winkler warned that women should be aware of the career time trap that many of them fall into. She explained that there are many women who forget about making career moves and are concerned only with the job at hand. The fact that they are women doing a job, instead of a workers doing a job, bogs them down and they lose sight of their career paths, she stated.

Another case study offered by the speaker focused on a woman who was unhappy at her job as a systems analyst. She said that within three days the woman was able to up her salary from $18,000 to $26,000 by making the right moves.

Women have to work two to three times harder than men in the same positions and they have to pay their dues, Winkler said. She concluded by quoting a former employer at IBM who told her, "If you make the right moves, you win." Winkler added, "You people here are indeed winners."

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Utility Sees Light With Data Administration

WESTBOROUGH, Mass. — Before embarking on the development of what is to be its biggest application system, New England Power Service Co. (Neps) personnel knew it was essential to eliminate dealing with software problems on an ad hoc basis.

Neps, which provides accounting and computing services to the other five companies comprising the New England Electric System, runs systems on a 24-hour basis with a mandated requirement of 98% up-time for on-line systems.

The processing environment includes an IBM 370 Model 158 for DP production and a Model 168 for systems development and back-up. Both mainframes run under MVS utilizing IMS and IBM's TSO.

Rather than go immediately into development of its new Customer Information Services (CIS) system, "we made an exhaustive study of systems failures," Joe Dzigas, data administration manager, explained. "From this [study], we identified the need for instituting a function for the control of our data resources and for tools to help us do it."

The result at Neps was the establishment of the data administration function for controlling the data resource and the selection of MSP, Inc.'s Datamanager data dictionary system as the data administration software tool, Dzigas said.

Three Elements

CIS is comprised of three elements dubbed Inquiry, Order and Base, he continued.

The on-line inquiry portion provides New England Electric's retail power companies in Massachusetts, Rhode Island and New Hampshire with the ability to answer customer inquiries in interactive mode. Thus, customers with questions about the status of their service or bills can get an immediate response, according to Dzigas.

On-line order deals with that part of the inquiry which generates a customer activity such as turning a meter on or off and the base portion of the system receives meter readings as input and produces a customer invoice, he explained.

All three CIS subsystems access common data elements, including company number, meter number, customer name and street address. Dzigas described Datamanager as an "invaluable mechanism for relating such shared data items to each other while keeping their identities distinct. Future failures related to unmatched data definitions in different programs are thereby prevented."

Natural Ally

The data dictionary is a natural ally for Neps' data-driven design, according to Dzigas. A lot of a given system's design can be drawn from data elements already defined in the dictionary and the interrelationships pointed out by the software package, he said.

Datamanager, for example, stores definitions of data elements ranging in size from single items to complete systems and relates these elements to one another. The levels of data currently stored by Neps include both IMS and non-IMS data and master files. The firm's data administration personnel also plan to store tables, input files, reports and files that pass data between programs, Dzigas noted.

Most DP installations spend more than half of available time and resources on systems maintenance, according to the data administration manager. At some firms, that figure soars close to 100%, according to Dzigas.

The majority of this overhead is due to mishandling the general design phase in system development, Dzigas continued. In order to avoid such problems, Neps implemented a data administration function, designed its system development life cycle and employed Datamanager with the goal of confining maintenance to an absolute minimum.

One of the most important facets of general design is designing the data base, he said. This entails identifying required data elements, expected frequency of usage of those elements, anticipated input means for each element and the system's teleprocessing requirements. At Neps, this identification is accomplished before the general design starts, he said.

Building Blocks

Once the general design phase begins, the elements are isolated into building blocks to form a structure for the data base. The structure and its requirements are then reviewed and an access method and procedures for reorganization, back-up and recovery are established, Dzigas said. As the repository of the Neps-defined data resource, Datamanager provides the necessary means to satisfy these identification requirements.

Datamanager also simplifies the data design task and minimizes chances of design errors by providing both the source and storage for the inputs and outputs of the design phase, Dzigas noted.

He maintained that Neps goal of holding down maintenance has been accomplished in three ways.

First, the care that went into the first stages of CIS development reduces the possibility of inadvertently missing significant user requirements, Dzigas said. Second, by using MSP's software to help establish a data driven design, the data administration department is building CIS to meet the system's essential purpose — data manipulation. Finally, once the system is complete, it will be thoroughly documented on Datamanager. Thus, "the groundwork which built CIS will be ready to support any changes," he said.

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Conference Goes On-Line

FAIRFAX, Calif. — An ongoing computer conference for Ethernet local-area network users is being organized by Computer Network News here.

Computer conferencing is a form of teleconferencing in which members share a common text space and can message each other publicly and privately via computer terminals. Communications are asynchronous, so participants can receive messages, which will be stored for later reading.

"Ethernet Online" will utilize the enhanced Telemail service provided by the Telephone Software Connection (TSC). Conference members will be provided accounts on the Telemail/TSC so they can track discussions on electronic bulletin boards. They will also be able to message each other privately.

Membership in Ethernet Online will cost $185/mo, plus Telenet connect time, the firm said from 425 Cascade Drive, Fairfax, Calif. 94930.

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Focus Study Warns S. 898 Strengthens Bell Monopoly

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The only way to prevent the phone company from engaging in anticompetitive behavior is to reorganize the 23 Bell operating companies, Western Electric and the Long Lines Division into separate, independent companies, according to a study released last week by three AT&T opponents.

If the stock in these new companies is then distributed to AT&T's present shareholders, both Bell customers and the shareholders themselves will come out ahead, the study suggested. It pointed out that virtually every major corporate spin-off during the last decade has produced "significant gains" for the affected investors.

One of the study's major conclusions is that the communications bill recently passed by the Senate (S. 898) will strengthen AT&T's monopoly, despite the legislation's stated intention to promote competition. The bill requires Bell to offer unregulated services through a "fully separated affiliate." However, the study argued that the fully separated affiliate is, by definition, unable to prevent AT&T from surreptitiously cross-subsidizing its unregulated offerings by transferring costs to its regulated activities.

The study was issued by the Fair Opportunities for Competition in the U.S. (Focus) group which was formed some time ago to promote divestiture of AT&T. Its three members are Southern Pacific Communications Co., General Datacomm Industries, Inc. and Millicom, Inc. — a specialized communications carrier, modem manufacturer and developer of an innovative wireless telephone system, respectively.

The lengthy study also asserted that:

- Since the fully separated affiliate, as established in S. 898, is "a 100%-owned subsidiary of AT&T," the phone company will be totally in control of the subsidiary's activities and "the fully separated affiliate management will be indistinguishable from what they would be if the fully separated affiliate is an ordinary division of AT&T."
- While the Senate bill requires the fully separated affiliate to perform its own research and development, this provision is negated by other provisions of the bill. Western Electric, for example, is free to provide basic components and subassemblies to the fully separated affiliate for six years. In addition, employees can be freely rotated between AT&T and the fully separated affiliate indefinitely and can easily carry proprietary information with them. Finally, through its membership on the board of the fully separated affiliate, AT&T can ensure that the latter's research activities do not duplicate or conflict with those of the parent company.
- If the operating companies were divested and made independent of AT&T, there would be an incentive to provide all equipment vendors with up-to-date information about their networks and to cooperate in numerous other ways, because this would tend to promote use of the networks.
- Western Electric's products are chosen by the operating companies because Western Electric is part of the Bell system even when those products are inferior to offerings from the competition. And "consumers must accept whatever features AT&T chooses to offer" because of AT&T's service monopoly.
- AT&T's current argument here and in other jurisdictions where it has filed for significant rate increases is that the increases are necessary because of "competitions" from specialized carriers. This is untrue, the study contended, since specialized carriers handle only 2% of the long-distance market.

Ansi Issues Two Standards

NEW YORK — The American National Standards Institute (Ansi) has issued a standard on optical character recognition (OCR) specifying both where characters can be located on a document and how those characters should appear.

Ansi has also developed a standard aimed at helping authors prepare computer abstracts and at assisting potential program users with selection of the right software for their particular needs.

Ansi standard X3.93M-1981 includes definitions and requirements for reference edges; clear and printed areas; margins; character skew, spacing, separation and alignment; and line spacing and separation. In short, the standard ensures that each OCR character can be seen with a reading device without interference from other characters or from non-OCR matter, a spokeswoman for the nonprofit organization said.

The new X3 standard has been adopted as a Federal Information Processing Standard (Fips) and is recommended by the Institute for Computer Sciences and Technology of the National Bureau of Standards for federal procurement, she added.

Ansi X3.88-1981 recommends that program abstracts: provide enough information for a potential user to determine whether the program is of interest; describe the application or system area and the specific functions in the program; identify the required software and hardware; facilitate indexing, searching and retrieval of information about the program; and state what program materials are available and how they may be obtained.

To help abstract writers attain these objectives, the standard provides specific recommendations on content and presentation of information, a spokeswoman said.

The standard was developed by the Technical Committee X3K7, a subcommittee of Ansi's Committee X3 on information processing.

Copies of both rulings are available for $4.50 each from Ansi's Sales Department, 1430 Broadway, New York, N.Y. 10018.

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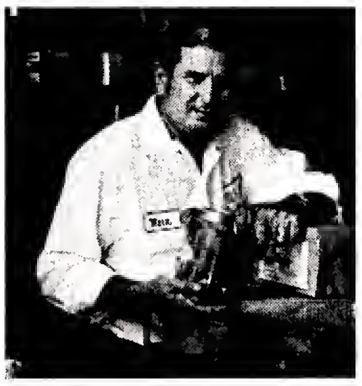

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Bank Cuts Mortgage-Closing Time With Mini

PROVIDENCE, R.I. — Old Stone Bank, one of Rhode Island's largest banks and leading residential mortgage lenders, is cutting the closing time on home mortgages from months to weeks with a stand-alone, minicomputer-based automated mortgage closing system.

"Home buyers have many things to think about — moving van, new schools and so on. They shouldn't have to worry about the mortgage-closing process, too," Joseph C. Petteruti Jr., vice-president of Old Stone Bank, noted.

"We used to average 10 or 11 closings a day with a 12-person staff and lots of overtime," he said. "Now we average up to 30 closings a day with 25% fewer people and no overtime. Training on the computer system is easy, so we can cross-train our people between the automated closing system and other department functions. It's good for them because they can widen their banking experience and it's good for the bank because morale and productivity are extremely high."

"We first knew we would someday have to automate our mortgage closing system as far back as 1965 when the bank decided to be a retail bank, not just for mortgages but for all consumer activities," according to Assistant Vice-President Thomas F. Richard. "We had a manual system, with filing cards and cabinets and we knew we'd need better control and greater efficiency to grow in the mortgage market.

"I did two studies, in 1969 just before the Truth in Lending Act — the first consumer law to affect us — and again in 1976," Richard said. "In 1969, it took 15 documents to complete a mortgage closing. In 1976, it took 39. Also, the documents themselves were becoming more and more complex."

Search Begins

In 1978, Old Stone began seriously listening to vendors' presentations. Quickly dismissed were word processing systems because they did not have the number-crunching power Old Stone needed, according to Richard.

"We considered buying from a software house that would supply everything we needed and write the software," he said, "but we would have ended up dealing with three vendors and the software house was located pretty far away; we were worried about support.

"We selected a Nixdorf Computer Corp. 8870 system because they make the hardware, they write the software and they support their systems. Also, they have experience in banking systems and they would help us through our start-up phase. The Nixdorf system was delivered in late September of 1979 and went up in two months' time with just three people — one from Nixdorf, myself and another bank worker — doing the installation."

To compete in the residential mortgage market, Old Stone was planning to sell into the secondary mortgage market, which consists of large investors — housing or other government authorities, banks or insurance companies — who buy bank-held mortgages.

"To sell into the secondary market, you've got to have standardized, consistently accurate documentation," Richard said. "And you've got to be able to prepare it fast because secondary offers have time limitations, sometimes 60 days. If you can't put the package together in time, you lose the funds. If there's an error, you not only risk rejection, but may lose your credibility, too."

Most important to Old Stone, the new automated system enables bank management to track mortgages through every point in the closing process. According to Assistant Vice-President Raymond Morris Jr., "With the manual system, a customer might call up and ask about his loan status and we'd have to scramble through paper files to get an answer. Now we know where each loan is. We'll let the customer know if something deserves attention, rather than vice-versa."

The mortgage-closing system hardware at Old Stone includes the Nixdorf 8870 central processor with 128K bytes of main memory and 10M bytes of disk drive, three CRT terminals, three cut-form printers and a line printer. The system is field-upgradable to 256K bytes and can support up to 12 CRTs or 11 cut-form printers. The system includes file-building and maintenance software that is used by the bank to name and define data items such as names, numbers and text modules and to set up a basic worksheet that organizes each new mortgagor's information into data base files that suit the bank's existing work flow and document organizations.

"One of our key documents is the letter of morgage approval we send to our customers," Petteruti said. "We've designed the system so each approval letter is customized to the particular customer's transaction."

As the closing process moves from qualifiying the prospect to property and insurance approvals, the automated system tracks each phase of the process, producing bank reports and automatic notification letters whenever necessary.

Popular Mortgages

The system covers all popular types of mortgages — conventional, Federal Home Administration and Veterans Administration — and all calculations are accurate, according to Nixdorf, as long as the original worksheet information is correct.

A system report generator enables bank management to track loans and forecast the department's cash position based on loan status. Each morning the system issues a report showing which loans are in process, which have been closed and which are marketable to secondary mortgage investors.

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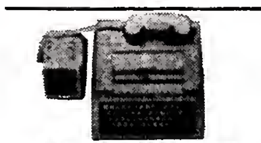
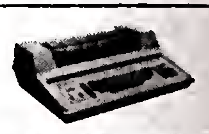
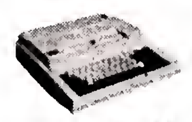
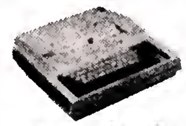
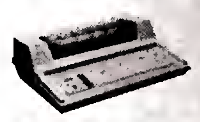
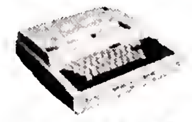
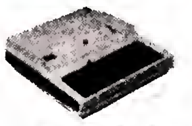
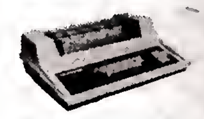
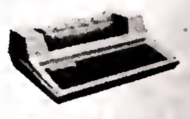
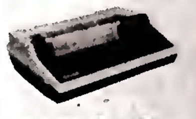
 Model 745 Portable	 Models 785/787 Portable	 Model 825 KSR
 Model 743 KSR	 Model 783 KSR	 Model 825 RO
 Model 763 KSR*	 Model 781 RO	 Model 820 KSR
 Model 765 Portable*	 Model 733 ASR	 Model 820 RO
		 Model 810 RO

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Too Much End-User Control

Report Blasts USDA's Computer Management

By Jeffry Beeler
CW West Coast Bureau

WASHINGTON, D.C. — The U.S. Department of Agriculture (USDA) has done such a poor job of managing its computing centers and software development projects that it lacks adequate systems resources and is unable to ensure the effectiveness of its new applications.

That grim assessment comes from the U.S. Comptroller General's office, which recently reviewed the USDA's information systems procedures at the request of Rep. Jack Brooks [D-Texas], chairman of the House of Representatives' Committee on Government Operations.

The comptroller's findings are detailed in a recently completed report that strongly criticizes the USDA for delegating too much software development control to its nontechnical end users. In general, the department permits its constituent agencies to develop and implement their own systems through any methodology they see fit.

The USDA's central computing office, therefore, lacks sufficient authority to force its users to abide by generally accepted software development practices. In the absence of uniform project management guidelines, the department's agencies frequently neglect to define their systems requirements or omit some other equally crucial program development activity, the report said.

Assorted Headaches

As a result, the USDA now finds itself saddled with an assortment of software-related headaches, including:

- Serious delays in installation schedules.
- Glaring mismatches between an application's intended function and its final design.
- Millions of dollars in cost overruns for six systems implementation projects.

The report also criticizes the USDA for skimping on capacity planning and failing to give its central computing office sufficient control over the department's four regional processing centers. Rather than concentrating all its information management responsibility in one place, the USDA has divided that power fairly equally among its many constituent agencies.

Weakness in Management

Weak central management has hampered the department's ability to ensure efficient use of its computing resources and has created an increasingly serious imbalance between user demand and available systems capacity. "Users of four USDA computer centers have expressed their dissatisfaction with availability, accessibility and response times," the study said.

The comptroller also blamed weak central management for the department's tardiness in replacing its aging, obsolete hardware and its failure thus far to use its newest processors to their full capacity.

In other comments, the report rebuked the USDA for failing to implement satisfactory disaster recovery procedures and adequate data security safeguards. Ineffective methods for controlling systems access, lax physical security and poor backup planning have left the department increasingly vulnerable to data leaks and extended interruptions in computing services, the comptroller warned.

Remedy Prescribed

As a remedy for the USDA's widespread computing ills, the report urged the department to comply immediately with the recently passed Paperwork Reduction Act, which requires each federal agency to assign the responsibility for efficient information management to a designated senior official. The report also advised the department to establish a central information resources management (IRM) office and a high-level steering committee to counsel the senior official on IRM matters.

Many of the USDA's current computing woes stem from a 1977 reorganization that merged the department's Office of Automated Data Systems with two other support groups to form the Office of Operations and Finance. In effect, the reorganization diminished the stature of the department's central computing operation, weakened its influence on user agencies and thus freed them to decide their own systems fate with little or no outside supervision.

Today, the power to find, select, develop and manage the USDA's various on-line applications lies largely in the hands of the department's individual agencies.

Only if a proposed project exceeds a preset dollar limit and requires a procurement are end users required to clear their installation plans in advance with top computing management, the report said.

This almost complete absence of centralized computing authority sometimes works to the USDA's extreme disadvantage. A classic case in point occurred in 1974 when the department embarked on the development of a new automated accounting and information system for the Farmers Home Administration, a member agency whose main charter is to promote agricultural and rural development.

That agency has already squandered an estimated $17 million and six years of labor on the Unified Management Information System which may eventually exceed its development budget by $25 million and take up to seven years longer to implement than originally projected, the report said. To make matters worse, the comptroller voices serious reservations about the system's ability to perform according to specifications.

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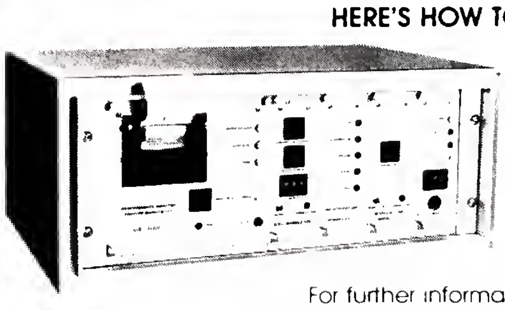

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Managers on the Move

KATIE L. NALL has been appointed computer services manager at the Harbor Branch Foundation, Inc. in Fort Pierce, Fla.

Nall is a former statistical consultant and also worked as a software engineer for ITT North Electric. She will assume her new responsibilities heading up all computer operations as of Dec. 1.

After attending Mesa Junior College in San Diego, Nall went on to earn a B.A. degree in mathematics at San Francisco University.

Nall studied statistics and computer science at the graduate school of the University of Georgia in Athens, Ga.

•••

JOHN H. SEYMOUR has been named information systems director at the *New York Daily News*.

Seymour joined the Daily News in 1978 as manager of systems and programming. Prior to that, he worked as director of development for the Depository Trust Co. and also as assistant vice-president and senior planning officer at the Security National Bank. Seymour began his career as a systems analyst at the General Electric Space Division.

Seymour graduated from the City University of New York, Queens College, and holds a master's degree in operations research from New York University.

•••

CHARLES F. MOSIER JR. has joined Belco Petroleum Corp. in New York as vice-president of management information systems.

Prior to coming to Belco, Mosier worked for Marathon Oil Co., most recently as manager of remote computing. Before that, he held process research and computing positions with Spencer Chemical Co. and Exxon Research & Engineering Co.

Mosier holds a bachelor's degree in chemical engineering from the University of Detroit and did graduate work at the University of Kansas.

Mosier has also participated in management programs at Indiana University and the Levinson Institute.

Mosier is a Fellow of the American Institute of Chemists, the American Institute of Chemical Engineers and the New York Academy of Sciences.

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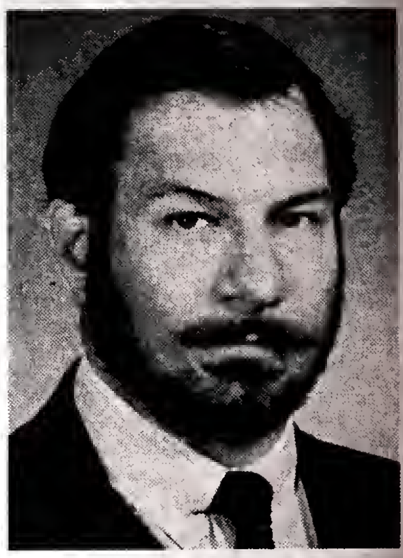

Martin I. Roth

MARTIN I. ROTH has been promoted to vice-president, director of data processing, at Maison Blanche of New Orleans.

Roth has directed computing activities since joining the company in April 1980.

Prior to his current position, he served as consultant to several U.S corporations and state and federal organizations. He most recently worked as Tulane University's director of financial management information systems.

After earning a B.S. degree from Monmouth College in New Jersey, Roth worked toward his M.B.A. at Virginia Commonwealth University in Richmond, Va.

Roth has also served as a board member for IBM and Honeywell Computer Users Groups.

•••

WARREN GINSBERG has been named director of management information services at Seaman-Patrick Paper Co. in Detroit.

Ginsberg's responsibilities will include overseeing the data processing department at Seaman-Patrick and all subsidiaries.

•••

DEWEY GOODRICH has been named assistant vice-president of data processing at Guardsman Life Insurance Co. in Des Moines, Iowa.

The former manager of management information systems joined Guardsman Life in August 1980.

Goodrich holds an associate's degree from Des Moines Area Community College.

PL/I Course Set for January

NEW YORK — Merrill Lynch, Pierce, Fenner & Smith will host a 10-day PL/I course here in January.

The course is taught by Software Education Corp. and will be held at Merrill Lynch's data center at 570 Washington St. The course reportedly will cover all PL/I language features and coding techniques necessary for programming use in a commercial/scientific IBM 360/370 environment.

No prior knowledge of PL/I is assumed, but students should have a basic familiarity with programming and system fundamentals. Experience in another programming language is desirable, but not necessary.

The fee for the 10-day presentation is $1,250, which includes computer resources for lab problems, the PL/I text by Joan Hughes and Software Education Corp.'s student handout.

Further information and registration materials may be obtained through Software Education Corp., Grace Building, 37th Floor, 1144 Ave. of the Americas, New York, N.Y. 10036.

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House Subcommittee Report Stresses Need

By Phil Hirsch
CW Washington Bureau

This is the concluding portion of a two-part analysis of the House of Representatives Telecommunications Subcommittee's report. Part 1 appeared in Computerworld *Nov. 16.*

WASHINGTON, D.C. — It is critically important to maintain a clear dividing line between basic and enhanced telecommunications services. If that division is not maintained, innovation will be squelched and telecommunications users may well be charged excessive rates.

That was a key point in a report on competition in the telecommunications industry recently issued by the House telecommunications subcommittee. The report will be an important source for subcommittee Chairman Tim Wirth (D-Colo.) and colleagues in the effort to draft a new communications act. The first version of that House bill is likely to be unveiled before the end of this month.

There is widespread agreement that "basic" telecommunications services and facilities — involving only transmission — should be kept separate from "enhanced" offerings, which act on message content or communications format. But not everyone agrees on how this can be done.

The House report was published shortly after the Federal Communications Commission (FCC) rebuffed an AT&T attempt to offer an enhancement — Custom Calling II — as part of basic telephone service. However, several FCC members, notably Commissioner Joseph Fogarty, strongly opposed that decision.

Another noteworthy event was the Senate passage of communications bill S. 898. One provision of the bill allows a "fully separated" AT&T affiliate to buy and operate transmission facilities from AT&T operating companies.

The House report mentioned this S. 898 provision shortly after pointing out that separation of AT&T's basic and enhanced activities is necessary in order to prevent bundling the two into a single service.

Representatives of the computer services industry argue that allowing the "separate sub" to own its transmission facilities will encourage AT&T to let its basic private lines services deteriorate, the report continued. According to this argument, customers will be forced to migrate to the subsidiary, which will offer enhanced versions of these same services without regulation.

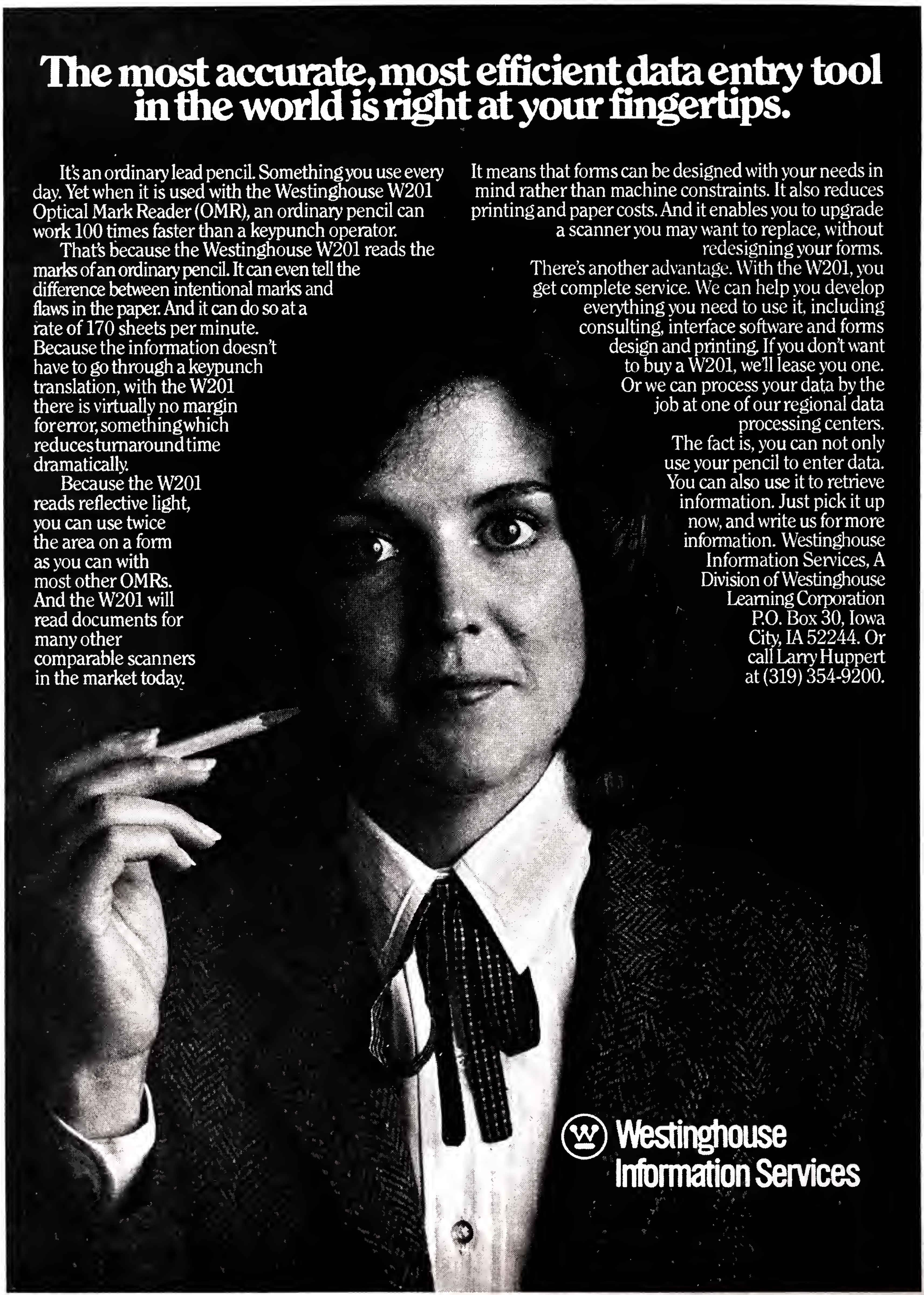
In addition, the basic service provider — an AT&T operating company — is likely to be supplying transmission facilities to independent vendors of competing

Decision Makers Slated for Info

LA JOLLA, Calif. — Dr. Stewart Schlesinger, president of the Society for Computer Simulation (SCS), has announced a new program to select the "Twenty Most Effective Decision Makers" around the world, specifically chosen to receive information on the use of computer simulation as a decision-making tool.

Schlesinger stated that many of those responsible for the most far-reaching decisions in the world are not always fully aware of the value of computer simulation and its use as a tool to explore alternative options. It is hoped that the list of 20 will include those people who interpret technical information for the ultimate decision makers.

The committee to select these influential people is now being formed and will include society members from around the world. Nominations can be sent to the society office at P.O. Box 2228, La Jolla, Calif. 92038.



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enhanced services. As a result, the operating company would be in a unique market position, as illustrated by Custom Calling II, a service designed to compete directly with the offerings of the nation's 5,000 telephone answering bureaus.

"AT&T and its affiliates and operating companies have access to the customer lists of all live telephone answering services," according to the House report. These lists would be available to the Custom Calling II sales staff if that service were offered through Bell operating companies.

Limited Services

Bundling Custom Calling II with basic telephone service could also encourage operating companies to limit existing services to the telephone answering bureaus. Subcommittee hearings conducted last September indicated that this has already occurred, possibly in anticipation of an FCC decision allowing Custom Calling II to be offered through the operating companies.

According to the House report, Southern Bell has proposed increasing charges substantially for its electro-mechanical switchboard equipment: the monthly rate would rise from $66.50 to $243, while the installation charge, now $470, would become $2,200.

Theoretically, an answering service can avoid these extra charges by leasing a competitor's equipment. However, competitors' switchboards are designed to interface with stored program controlled (SPC) telephone network switches, and many parts of the Bell system do not have SPCs yet.

These practices represent the "ultimate migration strategy," according to a spokesman for the Association of Telephone Answering Exchanges (ATAE) who testified before the subcommittee. He was referring to Bell's alleged policy of raising prices on older telecommunications equipment in order to make higher prices of new equipment more acceptable.

Analysis

"Instead of migrating customers from old equipment to new, the strategy as applied to the telephone answering industry is an attempt to migrate their customers to the Bell system's eventual offering of Customer Calling II," the ATAE spokesman maintained.

AT&T's ability to push prospective competitors to the wall is largely a result of its monopoly control of local exchange facilities in major metropolitan areas. According to the House report, this monopoly will persist for many years, despite much-publicized efforts to develop and deploy alternate technologies.

Local area networks, cable TV-based local distribution systems and similar facilities will serve "a relatively small number of users with high-volume needs," the report concluded, adding that "the large users with bulk demands for switched service that reaches anywhere within a city or region . . . will continue to rely on telephone company facilities."

Even though local distribution technologies will be restricted to relatively small, specialized markets, it is important for the new national telecommunications policy to encourage their growth, the house subcommittee staff said.

These new technologies can reduce a user's communications costs significantly. Manhattan Cable Co., for example, leases some of its capacity to Citicorp for data transmission, charging 20% less than New York Telephone Co. In order to encourage such competition, regulatory policy must avoid imposing entry restrictions and must ascertain that rates charged for local distribution service are cost-based or at least cost-related, the House report noted.

One way of restricting entry is to give telephone carriers an exclusive right to the limited bandwidth allocated to new radio-based communications services. That is what happened recently, according to the House report, when the FCC allocated freqencies for "cellular" mobile radio services.

Within the next few months, the FCC must decide whether telephone carriers should be allowed to offer digital termination services (DTS). Most prospective applicants for DTS licenses are nontelephone companies. However, one application came from GTE's Telenet subsidiary. Another was received from ISA Communications Services, which will soon become a part of United Telecommunications, Inc., the nation's second largest independent telephone carrier. It will be interesting to see if the FCC's policy changes now that the House subcommittee staff has spoken.

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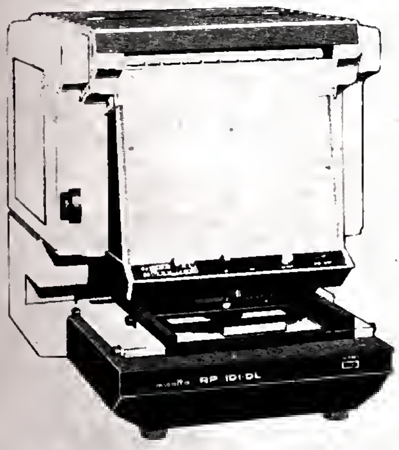

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Telecommuting: Not All Roses

There is some good news and some bad news about being a telecommuter.

The good news is exemplified by Martinez, Calif., housewife Angela Backman's experience with Heights Information Technology Service, Inc.'s Oakland, Calif., office.

Backman was a math teacher, then a computer programmer for five years before the birth of her son, now seven. "When he started the first grade last fall and was in school all day, I began to think about going back to work," she recalled.

"I took a refresher course. I did want to be home when my son got out of school, so this kind of work is ideal for me," she explained. "I do most of it while he is in class.

"It is a promising opportunity and I hope to continue this kind of work through the elementary school years," she said, adding, "There's another benefit. I save on commuting, lunches and clothes."

New-Style Workers

Besides mothers of small children, there is a host of new-style workers whose highest priority is flexibility in their work lives. Among Heights' panel members are those who want to avoid commuting, one attending school to become a cantor and one receiving time-consuming medical treatments.

Retirees find they can supplement, without exceeding, Social Security benefits and one programmer is able to meet his "personal requirement of a meditation routine that takes several hours a day," according to a Heights spokeswoman.

In an industry experiencing a severe shortage of personnel, part-time, at-home work can be a bonanza for those who choose to capitalize on their expertise.

Angela Backman with her son Mark, 7, at work in her Martinez, Calif., home.

"A professional can work in a consulting capacity for several firms at a time, as opposed to just one, and can make more money proportionately," according to Jack Nilles, director of the Center for Future Research at the University of Southern California.

Then there's the bad news. The bad news in telecommuting stems from the very freedom and independence that home workers cherish. "People get tired of working by themselves," Nilles observed.

In addition to feelings of loneliness, those who work for one employer "may worry about getting promoted because they're not in the situation to see the 'Big Boss'," Nilles said. "They feel they could lose chances for upward mobility.

"The impersonal personal computer is not felt to be a suitable surrogate for the 'pressing of the flesh' involved in high-level management conferences and casual meetings in the corridor," he noted.

Some Benefits Missing

Furthermore, there are not "the same kinds of fringe benefits; some perquisites disappear, such as niftier quarters, wider hallways, things you don't think about," Nilles added.

For those employed by an agency such as Heights, there also are not basic worker's benefits such as insurance plans, although Heights does offer courses and training to members.

Besides removing workers from the social life of the office, working at home can breed mistrust in the minds of fellow workers. "I still think there's a mentality around here that people who work at home are not working," theorized the telecommuting vice-president of a management consulting firm.

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Ten Million Telecommuters by 1990?

Companies Experiment With Telecommuting

'Mid pleasures and palaces though we may roam,
Be it ever so humble, there's no place like home.
— John Howard Payne, 1823

By Marguerite Zientara
CW Staff

The sentiment of Payne's couplet seems particularly appropriate today when, thanks to computer technology, more and more people are managing to combine their work and home lives and avoid a long commute.

Written in the heyday of the Industrial Revolution when workers were leaving home in droves to work in factories, the poem could be seen as a nostalgic glance backward at the first 10,000 years of human existence, during which people worked at home as a matter of course.

Recognizing that it is only in the last 300 years that out-of-home work has predominated, author Alvin Toffler in *The Third Wave* went so far as to predict that the office work place eventually may cease to exist or at least dwindle in importance.

Toffler claimed that the work place as we know it will be replaced by home and neighborhood work centers, comprising an "electronic cottage" in which families will live and work together on home computers linked to employers' computers.

Indeed, the electronic cottage is already a reality for an estimated 20,000 to 30,000 workers "mostly in the U.S., to a lesser degree in Europe and to an unknown degree in Japan, where they're very interested in it," according to Jack Nilles, director of the Center for Future Research at the University of Southern California.

Originator of the term "telecommuting," the ramifications of which he has studied since 1975, Nilles projects there may be as many as 10 million telecommuters by 1990.

Support for Toffler's and Nilles' predictions lies in the several corporate experiments now going on in the U.S. Control Data Corp., as part of its Alternate Work Site project, has enrolled 60 professional and managerial employees in a voluntary work-at-home pilot project.

CDC has also opened neighborhood offices in a nationwide experiment that has been, "for the most part," very popular and successful, according to Ronald A. Manning, general manager for office technologies. In addition, the firm plans to install word processing equipment in the homes of clerical employees who might otherwise drop out of the work force.

Besides CDC's effort, Walgreen, McDonald's and Mountain States Telephone & Telegraph have installed terminals in homes of the handicapped for programming jobs. The handicapped, in fact, may be the greatest benefactors of the concept of telecommuting, since it offers them a chance at employment they often would not otherwise have.

Lift, Inc., a nonprofit organization in Northbrook, Ill., has trained about 30 handicapped workers to write computer programs at home for companies such as Standard Oil Co., First National Bank of Chicago and Montgomery Ward & Co.

"The biggest factor is managers' problems with supervision — they can't physically keep an eye on people," Nilles noted.

Even though workers at home "tend to work at least as hard as and sometimes harder than those in the office" because they are removed from coffee breaks, gossip and office politics, Nilles said, "there is still the traditional idea that you've got to have a big office; it's an ingrained tradition."

Managerial resistance is, in fact, the major obstacle faced by Heights Information Technology Service, Inc. of Tarrytown, N.Y., the major American marketer of at-home computing.

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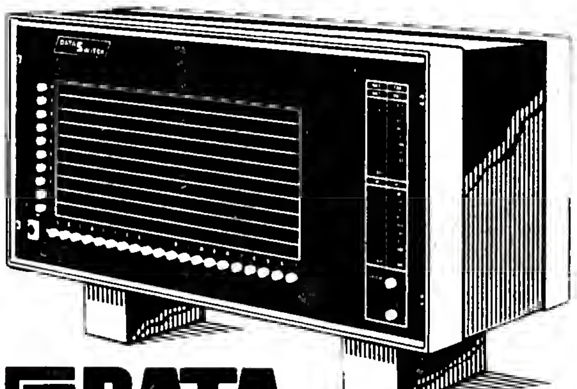

DATA SWITCH

Software: Copyright, Trade Secret or Patent?

WASHINGTON, D.C. — What is the best way to protect computer software? Speakers at a recent conference here on software protection said choosing among copyright, trade secret and patent protection for software is difficult, at best.

The conference featured speakers from its sponsoring organizations, the Computer Law Association, the U.S. Copyright Office and the U.S. Patent and Trademark Office, as well as attorneys who specialize in patent, copyright and trade secret law.

The speakers concluded that copyright is the easiest protection to obtain because it can be received merely by "creating an original work" and recording it "in a tangible medium."

However, most copyright speakers advised the audience to register their computer programs with the copyright office to obtain prima facie evidence of the date the work was created and the contents of the work itself. They noted that if a program is registered with the copyright office before someone infringes its copyright, the program's developer is entitled to request statutory damages and attorney's fees.

Gerald J. Mossinghoff, commissioner of patents and trademarks for the U.S. Patent and Trademark Office, told the attendees that a new form of software protection that is somewhere between the objective method of patent and the subjective method of copyright may be needed to protect computer software.

Mossinghoff acknowledged that, in the meantime, the patent office is trying to make patent protection of software more viable by both issuing guidelines on software patent protection and by reducing the time that it takes to obtain a patent (currently it takes two years).

The patent office is considering whether the patent law examination should de-emphasize engineering and begin to emphasize software more, according to Mossinghoff..

Source Vs. Object Code

In general, the speakers debated the advisability of submitting software to the copyright office in source vs. object code form. If only object code is submitted for registration, the copyright office's current policy is to delay registration and request a copy of the source code.

However, when a registrant refuses to submit a copy of the source code, the copyright office will proceed with registration of the object code "under the rule of doubt," if the registrant sends a letter substantiating that the object code represents a work of authorship. Some of the speakers expressed concern that registration under the rule of doubt might cast doubt upon the validity of the copyright registration.

The speakers in private practice said they would not advise their clients to submit computer programs in source code. Their expressed fear that software pirates would copy source code was somewhat allayed when a copyright office spokesman said the programs are stored in a warehouse and not indexed as computer programs. Therefore, a would-be pirate would have to know the author's name, title of the work, name of the copyright claimant or registration number of a program in order to request a copy of the work.

Representatives of the patent office encouraged attorneys to apply for patents if the software transforms or reduces an article to a different state or thing. However, attorneys also were reminded that software must be novel to be patented. Thomas Lynch, assistant solicitor of patents and trademarks, advised attorneys to avoid the pitfalls of unduly broad claims and inadequate disclosure when they try to patent software.

Trade secret law offers the best protection for software, according to Roger Milgrim, author of *Milgrim on Trade Secrets.* Any information used in a trade or business in secrecy that is not generally known and that is useful in competition is eligible to be a trade secret. He noted that computer software can be a trade secret if reasonable measures are taken to keep the program code and documentation secret. Milgrim warned that the government can disclose software to Freedom of Information Act requestors and, therefore, disclosure of program source code and documentation should be limited and carefully handled.

Complete transcripts of the two-day conference may be ordered from the Computer Law Association for $75 by contacting Daniel T. Brooks, Secretary/Treasurer, 6106 Lorcom Court, Springfield, Va. 22152.

Job Mart Helps To Ease Search

MINNEAPOLIS — Business People, Inc. here has developed a job mart called the Technical Career Job Fair.

The fair reportedly will enable 30 to 40 companies to meet job applicants and will provide job shoppers with a wide range of choices and opportunities to meet potential employers, a company spokesman explained.

This year the company is running 23 shows in 11 markets, including San Jose and Irvine, Calif.; Dallas; Houston; Washington, D.C.; Boston; Denver; Chicago; Phoenix; Fort Lauderdale, Fla. and Minneapolis.

Participating companies have the option of signing multiparticipation contracts with a lower cost per show, the organizers said. Business People, Inc. is located at 100 N. 7th St., Minneapolis, Minn. 55403.

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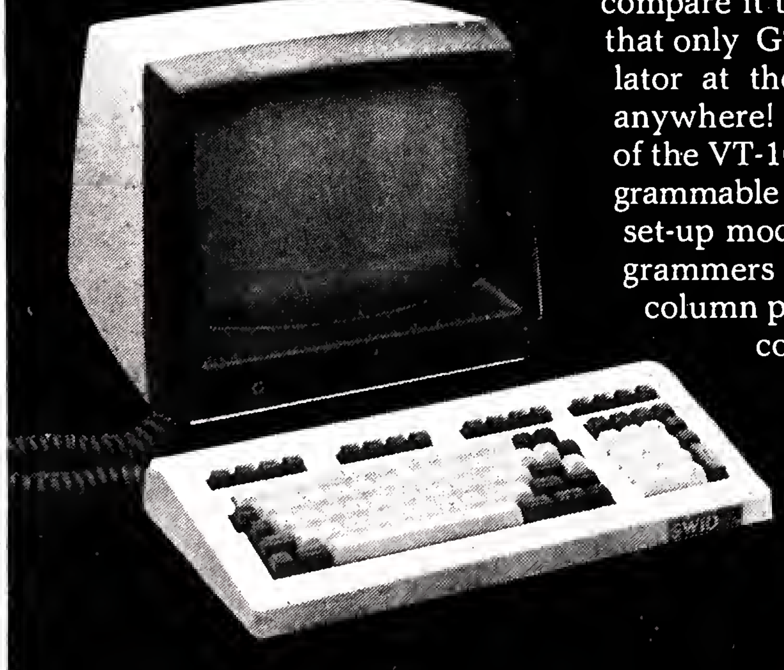

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WOODLAND HILLS, Calif. — Today's tight money market and high interest rates are forcing many banks to streamline operations and change the way they have traditionally done business.

In late 1979, high escalating interest rates compelled Security Pacific National Bank here to seek better control and accounting of its loan activity. Previously, its debt collections were handled manually at each of Security Pacific's 600 branch offices and at collection centers. Loan information was scattered in files and on ledger cards.

The bank decided to centralize all collections to six regional adjustment centers in Northern and Southern California and a charge card center. The six centers would communicate with a central system and data base in Woodland Hills, near Los Angeles, via a terminal network. The charge card center would be housed at the Woodland Hills facility.

"We first looked at packaged systems," Harold B. Einstein, Security Pacific vice-president said, "but none provided the data base management, system reliability and modular expandability that we needed. Once business was committed on-line, we could not tolerate interruptions due to downtime.

"It's ironic . . . customers can understand telephones being out of service, but not computers. They will tolerate a delay in paperwork, but not a delay in processing."

'Nonstop' System

Security Pacific evaluated systems from eight different vendors and selected Tandem Computers, Inc.'s Nonstop system.

"The deciding factor was their software for application development. Before we started the project, I was told application design/development for the basic collection system . . . would take four or five people at least two years. In reality, with three programmers, we did it in nine months — 250 programs and 47 screens," Einstein said.

If loan payment is five days overdue, the account becomes "active" in the collection system data base, he explained, noting that of Security Pacific's 1.5 million loan accounts, roughly 80,000 are delinquent or "active" at any given time.

When payment is 15 days overdue, the system sends the information to the appropriate collection center where a financial consultant attempts collection. While talking to the customer on the phone, the consultant has the complete loan history on the terminal in front of him.

If a customer responds that "the check is in the mail," the consultant instructs the system to recall the account again if no entry is posted within the next two or three days. According to Einstein, "At the six adjustment centers, the number of effective collection calls a day jumped from 7,425 to over 16,500 with less people."

The system supports 80 local terminals, 170 remote terminals and 10 printers. Of the 100,000 transactions processed each day, half are data base updates, he said. Each transaction that involves the retrieval of a new account requires about 22 data accesses and takes an average response time of one second locally and five seconds on remote terminals.

Four Techniques

Larry Hammond, a systems analyst with Innovative Software in Phoenix, served as the senior programmer in charge of Security Pacific's system. He worked with Tandem's DBMS Encompass, which uses four techniques to optimize transaction time. These are key-sequenced files, mirrored disks with overlapped seeks, split files over multiple drives and up to 255 alternative keys.

"Just using cache memory alone substantially boosted system performance," Hammond said. System design was eased by using a relational model, with the advantage that the program does not have to be altered every time there are file changes, he added.

When collections became operational, Security Pacific brought up lease accounting, general ledger, accounts payable, program development/documentation system and word processing applications.

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1 C cross compiler for the 8086. All facilities of the complete C language, including floating point for the 8087, are supported. Optionally, memory can be allocated for use with the 8088. Output is symbolic assembly language. The compiler is suitable for use in porting UNIX to the 8086.

2 Cross assembler/linker/librarian/downline loader for the 8086. Assembler input is an extension to that used by Intel. Loader output is a file in standard Intel hex format.

3 Simulator/debugger for the 8086. Capabilities include display, breakpoints, interpretive execution, as well as many others.

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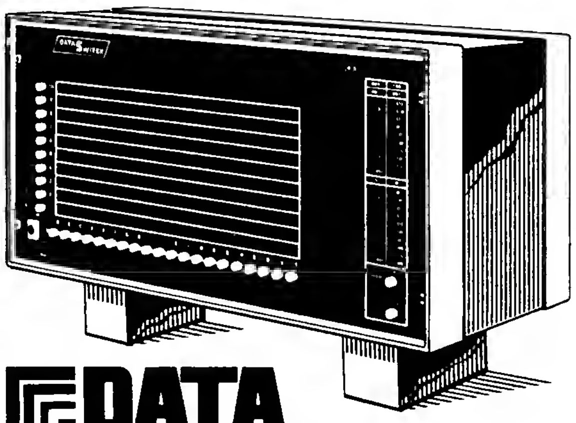


DATA SWITCH

System Ensures Productivity, Cuts Paperwork

PHILADELPHIA — The goal of Reliance Insurance Companies here was to make its branch personnel and independent agents more productive so they could be out selling rather than in the office pushing paper.

A means to this end was to make its current staff of programmers more productive, according to assistant vice-president for DP, Douglas C. Walters. The firm decided the answer was in a means to allow them to more efficiently use their time creating software, rather than letting them get bogged down in its administration and in solving programming problems.

Reliance ultimately selected Systemacs, a project life cycle methodology developed by Management and Computer Services, Inc. in Valley Forge, Pa.

"What we have implemented is a framework on which to build," Walters said, noting that Systemacs enabled his firm to get started quickly, but still have an approach that could be tailored to its use. The methodology also helped maximize the skills of Reliance's senior DP staff by providing a means of transfering their experience to the other members of the staff.

Five Phases

The approach has five clear phases, Walters explained, and these are project definition, external design, internal design, programming and installation. For each phase there is a standard list of tasks in a sequence that encourages top-down development and a list of rigorously defined, tangible products that meet that phase's objectives.

"This forces every project to be well defined before it is started, because each project is reviewed from all aspects — requirements, specifications, programming, program test, system acceptance criteria, and finally, production releases," Walters continued.

The goal is to help the user think more clearly about what he really wants from the system, rather than having to worry about what is in the system, which essentially is DP's problem, he said. In this way, the DP staff will be better able to understand and fill user-defined needs.

Checklists used for each phase assure implementation of each task to be done and help Reliance management quickly pinpoint projects that are having problems, Walters said. "It's a concept that works well, not only on major new in-house projects, but also on smaller projects [including maintenance]."

The resulting software, which is well designed and carefully constructed, will be simpler to maintain.

He noted that the approach also handles the implementation of purchased software as well. "This was an important consideration at Reliance, where it is understood that the tradeoff of function vs. time and dollars often favors the purchase of software products."

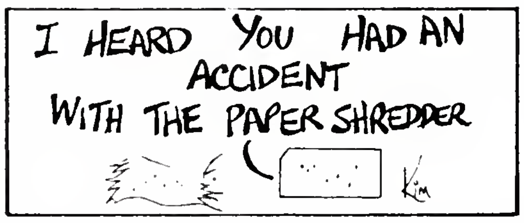
The methodology was phased in at Reliance, with each group within the company educated to its purpose and method. "Each was shown how it was to work and their role in it," Walters explained, adding that the company made a major commitment to the use of the methodology and realized it could work only if everyone understood its benefits and use.

Systemacs has been put to use at each of Reliance's three data center sites, which consist of an IBM 3033 processor, two IBM 3031 systems and one IBM 370/148, respectively.

"It has strengthened the communication between the system 'maker' and 'user,' standardized the development process and made project reporting more meaningful . . . even when multiple companies are involved in the development project and the programming staff [is] located a thousand miles away from their primary users," according to Walters.

He said it has become software project management by objectives and is helping to keep the DP department's attention on its purpose, which is to meet the information needs of its users.

As stated by Ken Burk, senior vice-president, "Our objective was to deliver new systems to our users at an increasingly fast pace so that our companies can stay ahead of the competition. Enlarging the staff wasn't the answer . . . improving the way we developed systems was . . . and that's what our project life cycle methodology is doing."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Hotel Firm Finds Room to Grow With Mini

ANDOVER, Mass. — "We were beginning to see the buds of significant problems," Paul Lopez, corporate controller for Inncorp, said.

"Occasionally our financial statements were late. Our cash flow was becoming erratic," he continued, adding that everyone "had a slightly different way of doing things."

These are some of the reasons why Inncorp, a manager of hotels and conference centers in New England, decided to switch from an all-manual accounting and administration system to a computer-based system. The firm installed the system, based on a Wang Laboratories, Inc. VS minicomputer, late last year and has been using it ever since to control its growing chain of acquisitions.

Headquartered here, Inncorp employs more than 1,000 people and currently owns and operates five hotels. Before the computer was installed, all of the firm's accounting procedures were performed manually. This system probably could have worked out well except that each hotel, acting as a separate entity, used its own accounting and reporting procedures, which tended to confuse things at Inncorp.

"Each property was financially functioning on its own," Lopez explained. "This made it very difficult to manage cash from a corporate standpoint," he continued.

It soon became apparent that if the company wanted to fully manage each of its five hotels and keep up with its goal of adding six more over the next five years it would need a computer system.

Choice Narrowed

After extensive research, which involved eight months of study and repeated trips to hotels that had computer-based accounting systems, Inncorp had narrowed its choice down to two contenders: Wang and Digital Equipment Corp. The company finally selected Wang on the recommendation of Hotel Data Systems, Inc. of Norwalk, Conn., an independent software supplier which markets programs aimed at multiproperty accounts.

The Wang system at Inncorp includes a VS computer with 512K bytes of memory, a Phoenix disk drive, a 75M-byte disk drive, a 288M-byte disk drive, five workstations and one 250 line/min printer. The computer is based at the firm's hotel in Boxborough, Mass., and three of the four remaining hotels each have a workstation. Because of its close proximity, the fifth has its accounting information physically transported to the Boxborough site for processing.

When Inncorp's five hotels were operating independently, they were not able to take advantage of such things as consolidated cash flow, he continued. While each purchased supplies from the same sources, all bills were paid separately.

"With the computer, our money base is now founded on the revenues of five hotels," Lopez said, "which facilitates timely processing of vendor payment.

Other benefits of a consolidated cash flow include taking advantage of volume buying from single suppliers and greater investing power, he added.

Along with cash flow, Inncorp centralized its payroll and has brought all of its clerical and accounting functions in-house. The latter resulted in an estimated savings of $2,000 to $2,500/mo in service fees alone.

"We have also been able to economize on our hiring as well," he said. "Instead of four or five accounting personnel in each hotel, our VS [minicomputer] has reduced this need to two or three people."

Presently, Inncorp is in the process of automating its front desk and reservations system and is looking at computerizing its inventory.

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Expandability Key Feature of SD-200

By Hillel Segal
Special to CW

With a mid-range benchmark performance, S.D. Systems' SD-200 computer begins our renewed look at computer systems in the under-$25,000 price range.

Expandability in storage and terminals seemed a key feature of the company's product line. The SD-200 is the second smallest in a group of four systems with similar processing hardware.

Starting with a one-user system based on CP/M, the SD-200 can be upgraded to a five-user setup, incorporating the Oasis operating system and hard disk storage.

With this column, we begin reviewing the continuation of Series 1 and 2 Benchmark Reports conducted for the Association of Computer Users by the CU Business Research Division in Boulder, Colo.

A dozen systems were tested in each series earlier and have already been reviewed for *Computerworld*. Now, more computers have been tested and the reports are becoming available.

Both Series 1 and 2 were based on the same group of benchmark tests and the times are directly comparable for all systems. The new computers' times can also be compared to the earlier results.

The tests themselves are all run separately. There are no simultaneous programs or multiterminal runs as was the case in Series 3, where multiuser capacity was being investigated.

Program Simulations

Again, we will be reporting the results of the scientific/engineering problem and the accounts receivable problem. Both are real-life program simulations. The scientific/engineering problem (C-1) solves a system of linear equations (50 equations with 50 unknowns) using the Gauss-Jordan method of elimination. It does not utilize any disk storage during the run.

The accounts receivable problem (C-3) creates a 50-record file on disk, with 10 fields in each record. The file then is updated 10 times, putting new information into the records. Finally, a report is displayed on the screen with the billing details. This problem utilizes a mixture of disk and memory operations and is, therefore, more of an overall test than is the scientific/engineering problem.

Generally speaking, our experience with Series 1 (under $15,000) and Series 2 ($15,000 to $25,000) indicated that the higher priced systems performed significantly better on the scientific/engineering test. However, the less expensive Series 1 systems held their own remarkably well in the accounts receivable test. It will be interesting to see whether that trend continues as we look at more recent system designs in this continuation.

SCOREBOX

System: SD-200
Current Price: $12,300

SYSTEMS UP TO $25,000

	C-1 Scientific Engineering Time (min)	C-3 Accounts Receivable Time (min)
Pertec PCC 2000	28:48.4	6:04.3
North Star Horizon	12:01.9	1.57.7
Cromemco System Two	14:52.6	2:48.0
Texas Instruments 771	22:05.4	3:38.1
Vector Graphic System B	19:30.0	5:56.5
Decstation 78	7:55.7	4:21.5
Radio Shack TRS-80 Model II	20:00.7	3:38.6
Apple II+	21:11.0	6:17.4
Digital Microsystems DSC-2	13:24.9	3:28.8
Ohio Scientific C3-A	12:10.7	15:49.3
Alpha Micro AM-1011	5:18.3	3:25.3
Data General CS/10 Model C1	58:21.0	*
SD Systems SD-200	17:42.8	6:16.4
Wang 2200SVP	to be covered in	
Altos ACS8000-15	future issues	
NEC Astra 205		
IBM 5120		

* Tested with hard surface disk rather than floppy. C-3 time was 2:40.3.

Mid-Range Results

The SD-200's benchmark runs uncovered no significant surprises. The scientific/engineering test time of 17 min, 42.8 sec was about average when compared with earlier times in Series 1. The accounts receivable time was a bit slower than average, but certainly within the acceptable range.

As tested, the SD-200 included a desktop processor with two 8-in. floppy drives (2M bytes total), 64K-byte memory, 12-in. screen and Texas Instruments, Inc.'s 810 printer. One serial port and one parallel port are provided. Including Microsoft Basic-80 and C basic languages, total price was $12,300.

The unit includes two Z80A microprocessors, one of which is dedicated to the CRT. Memory is expandable to 256K bytes and the number of terminal ports can be increased to five. Two extra floppy drives can be added as well. Winchester disk drives are available with either 5M bytes or 10M bytes of memory and from 32M bytes to 96M bytes of memory in larger drives may be supplied.

SD Systems offers several operating systems for the equipment. For single-user applications, a CP/M-compatible operating system may be preferred because of the large number of programs available. CP/M's cousin, MP/M, can also be obtained if it is desired for multiterminal applications.

This is the 42nd in a series of articles giving the highlights of benchmark tests conducted on popular small computer systems. The full reports were originally published by the Association of Computer Users, a 4,000-member nonprofit organization.

The more sophisticated Oasis operating system is available for either single- or multiterminal use. SD Systems in the past has offered the Cosmos multiuser operating system, but is phasing that out in favor of Oasis.

Relying on Dealers

In addition to the operating systems and languages, SD Systems offers the Word Star word processing package, but little other software. The firm, headquartered in Dallas, prefers to leave all applications programming support to the dealer.

According to a spokesman, no accounting software is offered, but packages are available to customers through the dealership network of some 60 dealers in the U.S. For customers using the Oasis operating system, accounting software by Open Systems, Inc. was often recommended.

Maintenance service is also the responsibility of the local dealer. The system comes with a 120-day warranty that is honored by the dealer.

A dozen users were surveyed for the benchmark report and they reported good hardware reliability and general satisfaction with the system. However, there were a number of complaints about documentation and these were echoed by comments from the benchmark team.

Asked about this, a representative of SD Systems stated that they had "had a significant problem" with early documentation, but were working to correct it.

The spokesman said a technical writer was working to improve existing documentation and the company was preparing a new training manual for the system. Problems with documentation on early applications software, no longer offered, were also noted.

Owned by Syntech

SD Systems is owned by Syntech Corp., a firm that uses computer equipment produced by SD Systems in its own transaction processing business. SD Systems also sells Z80, S-100 bus-compatible computer boards and board kits to other manufacturers and said 25,000 of these have been installed. The number of complete computer systems sold, however, was put in the hundreds in recent advertising.

On balance, the hardware expandability and standard operating systems seem to be the SD-200's strong points. Provision of a smooth expansion path from one to five users through terminal and disk add-ons is perhaps the system's most significant feature.

Points of caution to note would involve evaluating the dealer, since training and maintenance support would be that firm's responsibility. And, as always, the user should determine what it expects the computer to be used for and look closely at the software that is going to be involved. Training and documentation associated with the software should be considered as well. With a complete picture of what you would be working with after the purchase, you can avoid problems of usability at the start.

Hillel Segal is president of the Association of Computer Users, a nonprofit association with members in the U.S., Canada and several other foreign countries. A package of information about the Association of Computer Users is available from the group at P.O. Box 9003, Boulder, Colo. 80301.

Correction

The Scorebox listing for the Burroughs Corp. system covered in "Burroughs B91 Features Advanced Processor" [CW, Oct. 19] should have listed the Burroughs B91 and its price as $28,562.

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Updates Inventory, Sales Daily

Bookseller Finds POS Net Good Acquisition

STAMFORD, Conn. — After installing an IBM 3680-based point-of-sale (POS) terminal network, Waldenbooks' 700 stores are able to transmit sales figures, titles sold, merchandise orders and other data daily to the company's 3033 in Anaheim, Calif.

From there, the information is transmitted to Waldenbooks' headquarters here where it is compiled into reports that are sent to each store weekly.

These reports help store managers maintain stock levels of both new releases and steadily selling or backlisted books, expand high-interest sections, and evaluate various display and merchandising techniques. Managers are thus able to do their jobs more effectively with less time-consuming routine work.

System Goal

When Harry Hoffman became president of the Waldenbooks division of Carter Hawley Hale Stores, Inc. in 1979, the company's POS capabilities encompassed only 70 stores. The remaining 500 had mechanical cash registers without information collection capabilities.

"I felt very strongly that to build both profit and service levels we needed more up-to-date information on what was selling, what was in stock and what should be reordered. Only a full-scale, computer-based system could give us the tools required to make sound marketing decisions," Hoffman said.

By emphasizing the DP requirements of Waldenbooks, Hoffman, in effect, defined a goal for the management information systems (MIS) department to develop a completely new system that would handle current business requirements and yet could be adaptable to more complex functions in the future.

Choice of Unit

It was only a coincidence that IBM introduced its 3680 programmable POS terminals on the same day that Hoffman took over as president of Waldenbooks. However, it was not long before Waldenbooks decided to install the new units.

"It was a bold commitment at the time because nobody had ever used the IBM units for the type of communications system we wanted," Hoffman asserted.

Terry Kelley, director of MIS at Waldenbooks, said, "We believed the hardware was totally programmable to our needs as booksellers and that we could design a software package which would bring the computer in line with our objectives rather than having to adapt our program to fit computer capabilities."

The flexibility of the system was viewed as an asset. So was IBM's national field engineering support. Another major technical feature that swayed the data processing staff was the floppy diskette.

"We wanted to capture individual store data at the end of every day in a host computer," he said. "Yet we recognized this was unrealistic in even the best communications system because of any number of variables which can pose problems.

"With diskettes, we can pull data at any time without loss. You can't do that with tape. Also unlike tape, diskettes don't have to be 'closed' before another period of information can be amassed. Plus, diskettes hold more data and are more easily reprogrammable," Kelley added.

As it turned out, the reliability factor was high even during the phase-in stage. Waldenbooks has found that less than 2% of the hundreds of stores now on the system average more than two days unpolled.

Advance planning, intensive limited testing, a phase-in approach and a home office "help desk" to answer any POS questions that people in the field might have were cited as major factors in the smooth conversion, the scope and complexity of which could have easily been chaotic.

Between the initial decision to use the units and the actual delivery of the first 3680 for testing and programming, more than a year passed in which detailed plans for installation, desired functions, software parameters and future plans were made.

Crash Program

Upon receipt of the first unit in April 1980, the company did a crash program to modify IBM's basic package. Within six weeks, a simplified system was ready for installation and by July 1 a more intricate program was in test. Following the test, slight modifications were made and six weeks later, installations proceeded as fast as units could be supplied to the company.

The stores that were originally on the simplified system recorded the sales of titles by International Standard Book Numbers, automatically calculated necessary tax, determined change for the customer, identified the employee making the sale and gave department totals.

The redefined system includes these functions along with expanded inventory control features such as merchandise ordered, received, returned and transferred — all tied into the cash register.

The last stores to be converted to POS went on-line in late October. All new stores, opening at the rate of 80 a year, will be on the system.

The actual installation of units was handled by individual store managers with the help of a complete guide book prepared by the Waldenbooks home office. Instruction books, with detailed line drawings, even told how to unpack the hardware and gave a list of self-testing measures to avoid errors at common trouble spots.

The company conceived of a "help desk" for POS questions from the field. It was staffed alternately by various members of the DP and store operations departments, with someone always available to help an employee overcome an impasse.

The company had managers install the units to make them familiar with the equipment quickly. Besides achieving this, the company received a side benefit it had not anticipated — immediately higher sales.

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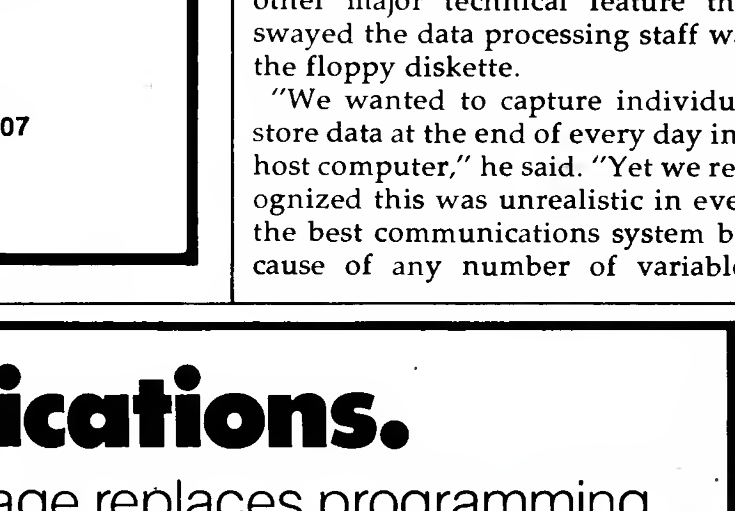
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Part 12 . . .
What's Past Is Prologue: A Glimpse Into the Future

By Marguerite Zientara
CW Writer/Analyst

'In walking the thin line between innovation and hubris, will man overstep his bounds in an attempt to create a machine too like the human brain? Will we try to manufacture an amoeba, or an "emotional" robot or an android superior to us in every way? And will we succeed? Such questions plague the minds of those who perhaps know "too much and yet not enough." '

Speed and miniaturization are still the bywords of computer development.

From the very beginning of the history of calculation — through abacus, the mechanical calculator, electromechanical relay devices, vacuum tube technology, the transistor and the microprocessor chip — progress has been toward faster and more reliable technologies.

While Howard Aiken's Harvard Mark I computer [CW, Sept. 21] in 1944 took about five seconds to multiply two 10-digit numbers, Eckert and Mauchly's Eniac computer [CW, Nov. 2] only two years later multiplied 500 pairs of 10-digit numbers per second. Today, the Cray Research, Inc. Cray-1 scientific computer can multiply 240 million pairs of 16-digit numbers per second. And the Cray-2 — scheduled to be released in 1984-85 — is expected to multiply up to 2.8 billion pairs of 16-digit numbers per second.

Size, too, remains a concern of computer scientists. Since the room-sized Mark I and Eniac computers were built, the machines have steadily shrunk to the point where scientists foresee within a few years a computer the size of the human brain, but with speeds 100 or more times faster than the Cray-1.

Speed and size have always been, and today remain, intrinsically linked in the technology of the moment. Major advances in speed have historically been because of the development of faster switches. While the Mark I's relays could switch in a few thousandths of a second and Eniac's smaller tubes switched in a millionth of a second, modern fingernail-size chips can do the same in only a few billionths of a second.

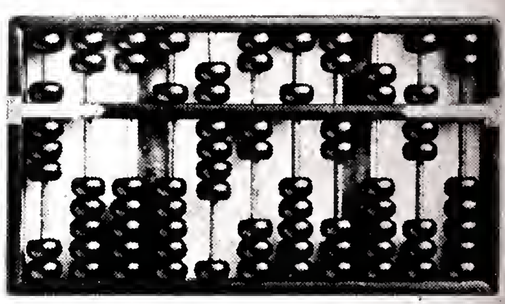
Electrical signals can travel through a circuit at roughly half the speed of light, or six inches in a billionth of a second. Scientists have packed switches closer and closer together to cut the distance the signal must travel, trying to create progressively faster computing speeds.

Unfortunately, such dense packing can cause components to melt from the heat generated by electrical signals. With switching devices continually shrinking in size, the barrier to faster computing times — instead of stemming from the speed of the switches themselves — can now be

This is the final article in Computerworld's 12-part series on the History of Computing. Reprints of the series will be available in booklet form in the first quarter of 1982. Requests for reprint information should be sent to Carol Audlee, CW Communications/Inc., 375 Cochituate Rd., Box 880, Framingham, Mass. 01701.

Courtesy Universum Film Aktiengesellschaft; Academy of Motion Picture Arts and Sciences

A vision of the future? From Fritz Lang's 1927 film "Metropolis," in which the scientist Rotwang creates a robot worker in the image of the heroine, Maria.



Courtesy IBM

The abacus is one of the earliest — and by far the most enduring — calculators.

traced to the distance between switches.

Future systems will have to incorporate new switching technology — possibly modeled after the revolutionary Josephson junction now in development — to surmount this problem.

The Josephson junction is a switch that generates only microwatts of heat — thousands of times less than high-speed transistor circuits. This allows them to be packed extremely closely together, thus solving the problem of distance between switches.

The switch is based on the property of superconductivity, the total loss of resistance to electric current flow in many substances at temperatures near absolute zero.

While modern chips now switch in a few billionths of a second, Josephson logic circuits — expected to be available in the 1990s — would be capable of switching in 50- to 100 trillionths of a second (picoseconds).

In computers based on the Josephson technology, six inches traveled in a billionth of a second would actually amount to 10 times the calculation rate of today's fastest machines and 25 times the speed of today's general-purpose computers, because so many more switches would be crammed into those six inches.

Scientists envision a compact unit of electronic components the size of a coffee can suspended in a bath of liquid helium at 4.2 degrees above absolute zero, or -452 degrees F. A maze of tiny wires would transport power and data in, and results out. Inside, millions of minute Josephson junctions would perform billions of mathematical operations every second.

Another innovative cooling technology will make the scene with the Cray-2, in which the computer's entire circuitry will be immersed in an inert fluorocarbon liquid developed by 3M Corp. back in the days of World War II.

Although the liquid did not prove useful for much of anything four decades ago, its complete lack of electrical properties promises it a home in the computer technology of tomorrow. While it will only cool the circuitry — as opposed to the Josephson junction's "supercooling" effect — the liquid is said to guarantee perfect heat dissipation.

The resulting close packing of computer components will allow the Cray-2 to feature a maximum 16-in. wire length, versus the 3-ft length in the Cray-1 or 6- to 12-ft in current commercial computers. The Cray-2's switching speeds would reportedly be only slightly slower than the Josephson junction's.

One of the potential benefits of such technology is the fact that, unlike the Josephson junction, the Cray-2 would not require a tightly sealed box to protect its liquid. Therefore, while the Josephson junction would be largely inaccessible, the Cray-2 would be quite easily maintained and would not require as much special equipment for use.

Are we fast approaching the ultimate in miniaturization? Scientists think not, observing as they have the staggering amounts of data contained in a single DNA molecule, for example, or in one-celled animals and plants visible only under a microscope. "Even the amoeba is a far smaller and far more powerful information processor than today's best chips," one observed.

Future Applications

But is all this staggering progress really necessary? Don't computers do things fast enough already? Not in such areas as long-range weather prediction, which directly affects

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All you have to do is submit your entries on the form below, or a reasonable facsimile. Make them SHORT (buttons are very small), funny, and relevant. Our usually sober judges will take all the entries into a smoke-filled room and emerge several hours later — dizzy from laughter, smoke and drink — clutching as many as six winners in their tired hands.

All decisions of the judges are considered final and no representations as to their competence, skill or fairness are being made. Deadline for entries is December 31 in our offices in Framingham, MA. All entries become the property of CW Communications/Inc.

HINT: Quality is more important than quantity. Sending in lots of entries will not increase your chances of winning (in fact, reading through a slew of similar slogans from the same person drives us nuts!) Write down everything you can think of that tickles your fancy, then take a while to pick the two or three best ones to send in.

Yes, I'd like to enter your ridiculous button contest. I have read the rules. (I hope your judges can still read when they get to this one.) Here is my entry (if you have more than one, put them on separate forms).

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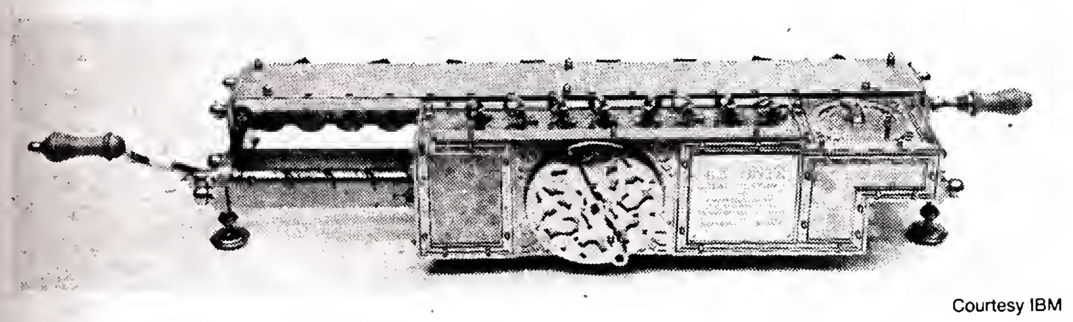

Courtesy IBM

Wilhelm Leibniz's Popular Mechanical Calculator, 1673.

crop management and therefore the world's food supply; and not in space surveillance, where satellites have generated immense amounts of data that simply take too long to digest.

In the Landsat program, for example, existing supercomputers are even finding it a challenge to handle the large amounts of processing required. Data rates are so fast and the processing so significant that currently we have only "band-aid solutions," according to observers.

Another area in need of the speeds of supercomputers is oil exploration, in which oil companies can model oil reservoirs before drilling in order to best determine how to extract the "liquid gold."

Arco, Exxon and Shell Oil (UK) have all installed Cray supercomputers, and Chevron will be installing one in February. According to one oil company analyst, computer modeling of one company's share of the Alaskan oil field can result in increasing total oil production by a minimum of 1% to 2%.

"With an estimated total value of $100 billion, that translates to direct added revenues of $2 billion," he noted, comparing the savings to the $10 million supercomputer price tag.

Within the computer industry, supercomputers are edging into the design and development of memory chips, where the mark of success is fast becoming not the complexity of chip design, but rather the speed with which a developer can get a new design to the marketplace.

Supercomputers can help chip makers to simulate and analyze chip designs so they do not actually have to be built. The only chip developer so far to use a supercomputer for the task is Bell Laboratories, which is reportedly feeling dramatic advantages from reductions in chip development time from six months to two or three weeks.

Another nascent supercomputer market is structural design and analysis in such industries as automobile and airplane manufacturing. Simulation tests can reduce the number of prototypes that have to be built, thus saving time and untold millions of dollars in production costs.

A possible future application of supercomputers is business strategic forecasting, wherein the turnaround time on a complex model could be reduced from two hours on an IBM 3033 to five minutes on a supercomputer, one analyst estimated.

But in walking the thin line between innovation and hubris, will man overstep his bounds in an attempt to create a machine too like the human brain? Will we try to manufacture an amoeba, or an "emotional" robot or an android superior to us in every way? And will we succeed?

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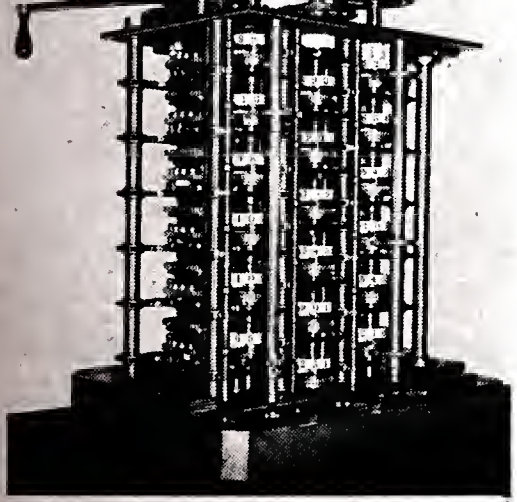
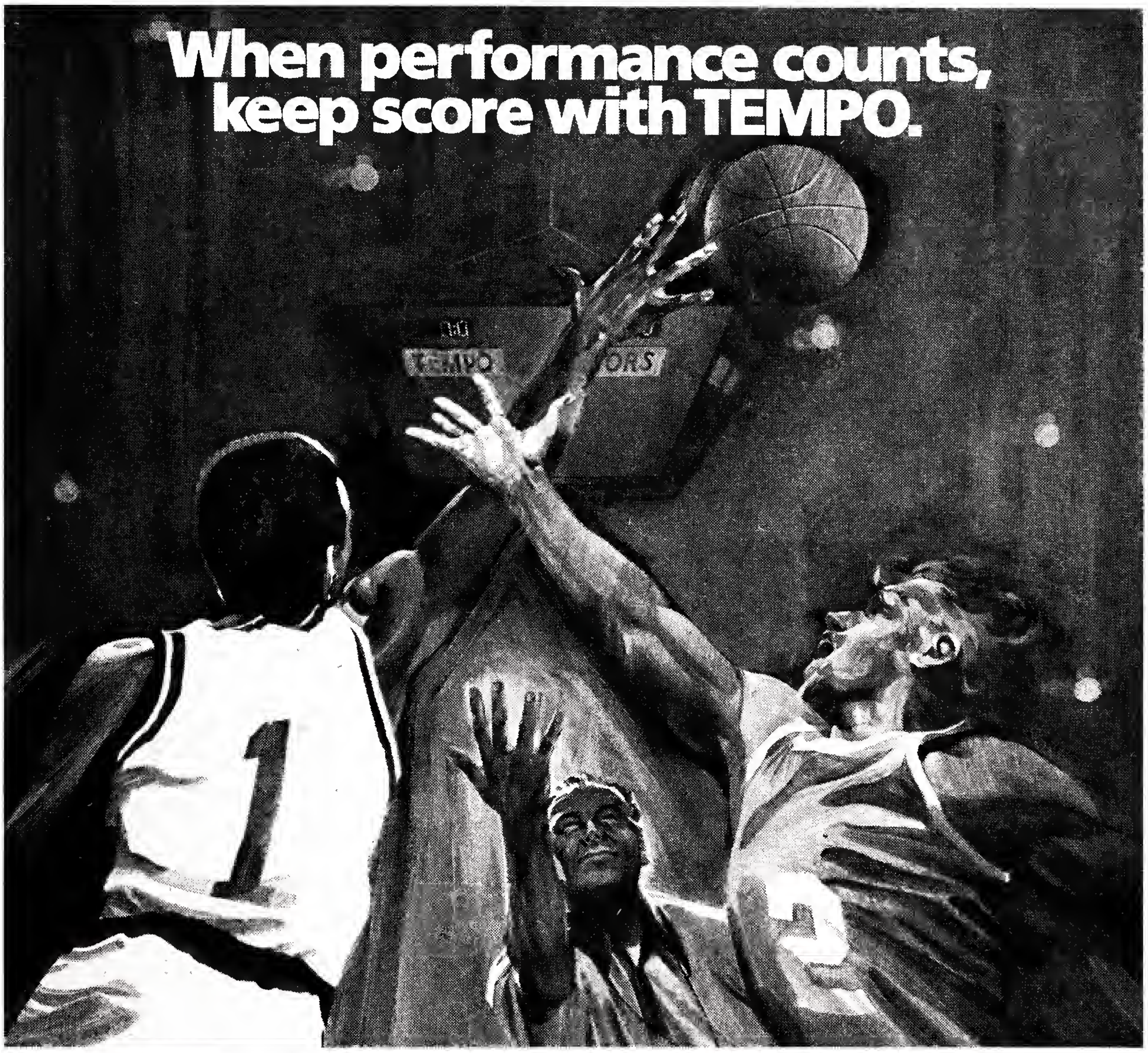


Courtesy IBM

Charles Babbage's Difference Engine, as Reconstructed From His Writings. Conceived 1821.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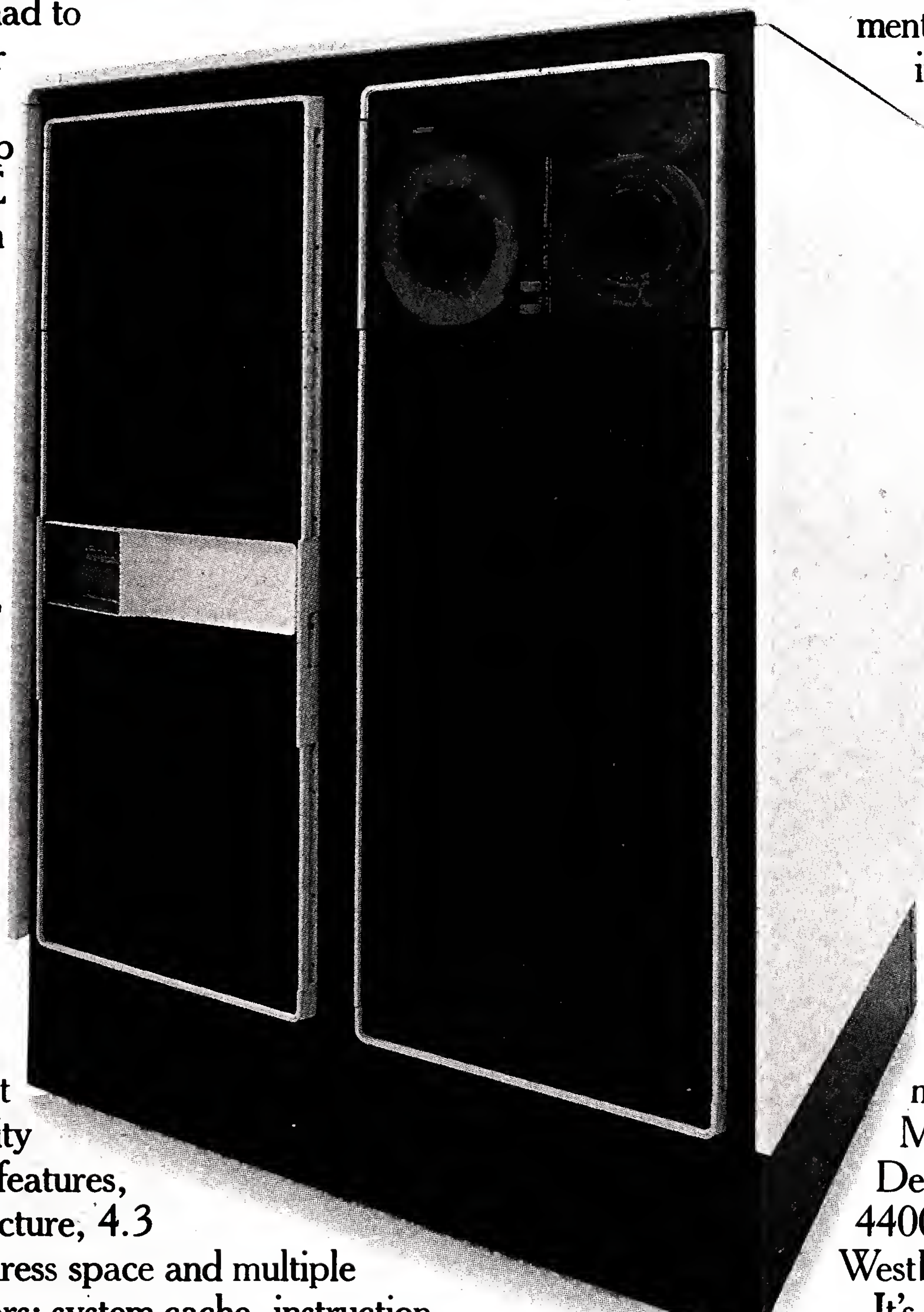
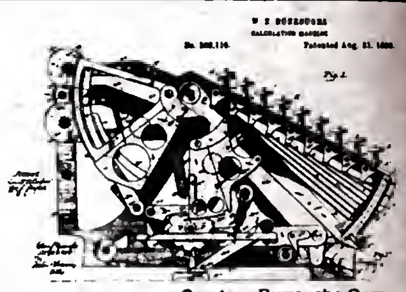


principle that I would seriously believe we can't do," said Roger Schank, director of Yale University's Artificial Intelligence Laboratory.

"The only one is this emotions issue," he noted, explaining, "We probably won't be able to give these things emotions, though we'll be able to have them act as if they have emotions."

Now the question is, do we want something around "acting as if" it has emotions? Isn't that the worst kind of chicanery? Or would it be a real comfort to the growing numbers of people who will spend their days working with machines? Would it break up the tedium or would it be an insult to human intelligence.

Humans being what they are, the answers to such queries undoubtedly will depend on the human and machine involved in any one situation. In any event, it would be wise to examine just how far we've gone in developing artificial intelligence and what we may expect in the future.



Courtesy Burroughs Corp.

Diagram of William Burroughs' Calculating Machine, Patented 1888

Artificial intelligence (AI) is an examination of the way humans perceive and assimilate data, reason abstractly, adapt and communicate in an effort to produce such behavior in computers. Although the formal discipline is a new one, questions regarding the nature of intelligence were being asked 50 years ago by such computing pioneers as Alan Turing [CW, Oct. 5], Norbert Wiener [CW, Aug. 10, Oct. 5] and John Von Neumann [CW, Nov. 2].

As of now, the useful development of AI centers almost exclusively around computer-controlled industrial robots, and the acknowledged worldwide leader in the field is Japan.

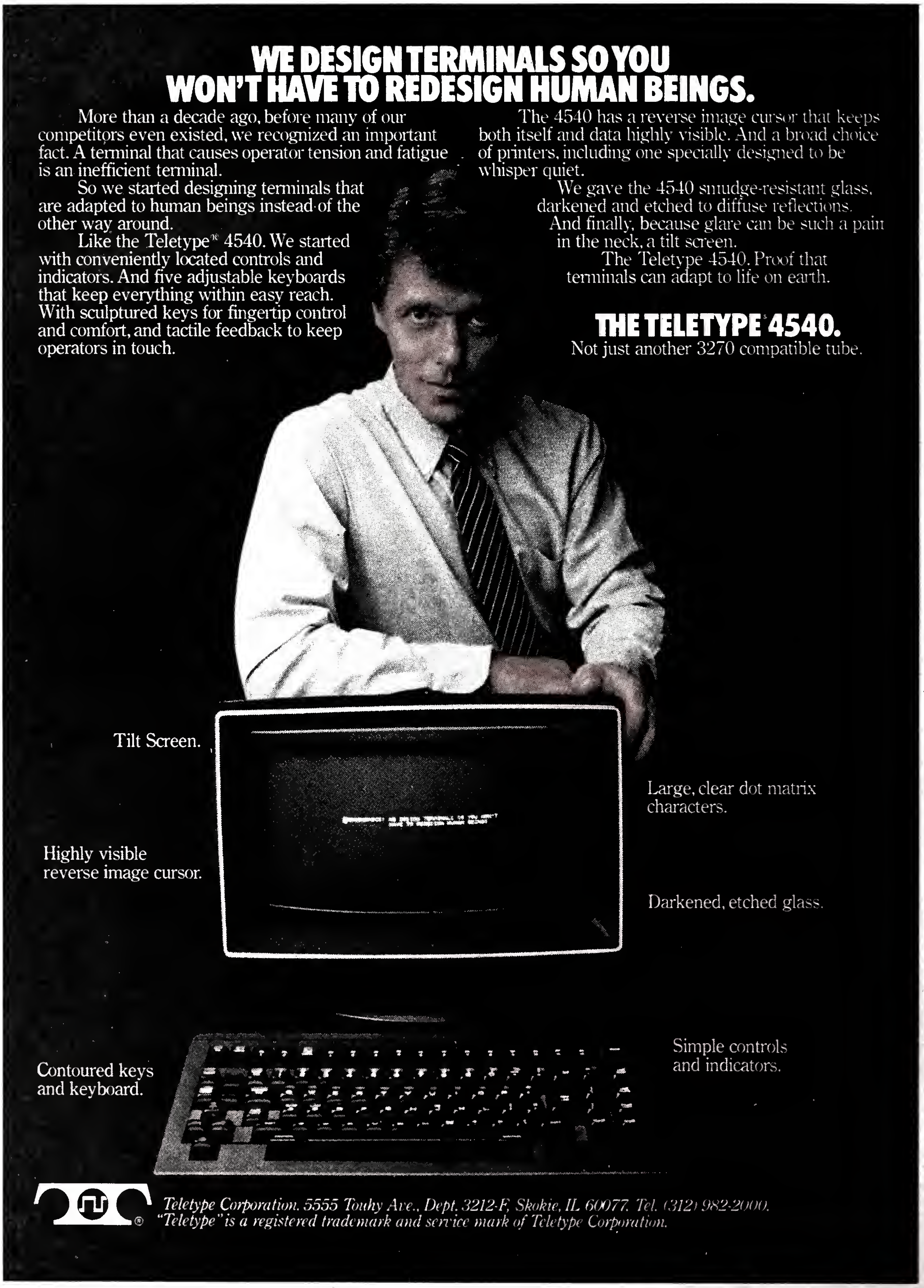
Typical of the Japanese robotic environment is an engine factory in a suburb north of Tokyo that employs a small crew of human workers during the day, at the end of which robots take over the work and toil tirelessly throughout the night under the supervision of a lone human overseer.

The Japanese have also moved quickly in the area of automated semiconductor production. They have automated the bonding process — attaching fine gold wires to integrated circuit chips — while the U.S. continues to have the task done in Southeast Asia by assembly workers.

The result? Japanese companies have achieved better quality and reliability and higher yields, allowing them to claim a significant share of the world semiconductor market.

Furthermore, last January, Fujitsu Fanuc opened a $38 million plant that utilizes robots and numerically controlled machine tools to manufacture other robots and automated equipment. This year the plant will employ 100 workers to produce approximately 100 robots each month — about one-fifth the number of workers needed to do the same job in a conventional plant.

Like the engine factory, the Fujitsu plant operates 24 hours a day, with human workers assigned to assemble the parts the robots have made during the night. By 1985, Fujitsu hopes to have its elf-like robots performing assembly tasks as well.



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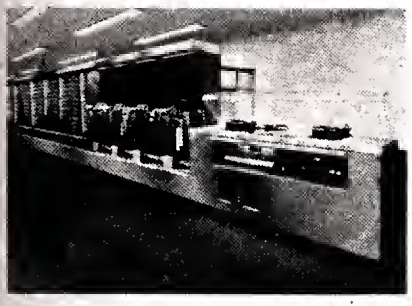

Courtesy IBM

Howard Aiken/IBM's Harvard Mark I, the first automatic, general purpose, mechanical relay, digital calculator. 1944.

The Japanese reportedly are also developing a new generation of robots expected to be able to handle objects with great precision. Nippon Electric has an in-house robot named Arms-D, said to operate at micrometer-level tolerances.

Nippon Electric claims that the Arms-D technology could ultimately cut the electronics factory work force in half, because it would be more economical to produce many kinds of products in small amounts. Arms-D reportedly will be commercially available in several years.

In the U.S., car and farm- and truck-equipment manufacturers have pushed hard in the last year to make some progress in robotics. Rising labor costs and foreign competition convinced these manufacturers to pour millions into retooling factories and installing robots on assembly lines for welding and parts selection.

"A robot can perform the functions of two people," according to Mark Cocroft of General Motors Corp., which expects to have 14,000 to 15,000 robots by 1990. GM's current robot population, including those on order, stands at 1,000.

Chrysler Corp. spent $75 million retooling for robots in its K-Car plants last summer, and now has about 220 robots in three plants. Ford Motor Co., now with 246 robots, expects to double that population by 1984. Ford and GM both use robots for numerically controlled painting projects, as well as for emission checking and the thankless tasks of loading/unloading and stacking/unstacking goods and pallets.

At the Springfield, Ill., body plant of International Harvester, 52 robots spot-weld tractors and truck bodies. Two robots perform heavy press loading at the firm's Louisville, Ky., plant and in Cincinnati, axles are forged by robots.

While microprocessors control smaller robotic movements, most of the robots used by the auto and farm equipment manufacturers are run by minicomputers and even mainframes. John Deere uses a Digital Equipment Corp. PDP-11/44 and an IBM 370 for nearly all its factory operations, including bookkeeping and payroll.

A significant breakthrough in robotics recently came from Machine Intelligence Corp. (MIC) in a development that promises to revolutionize the manufacturing process. The breakthrough is a first step toward the solution of what AI researchers call "the vision problem."

After years of research at such academic institutions as Stanford University, Carnegie Mellon Institute and SRI International, a nonprofit research institute, MIC has made commercially available

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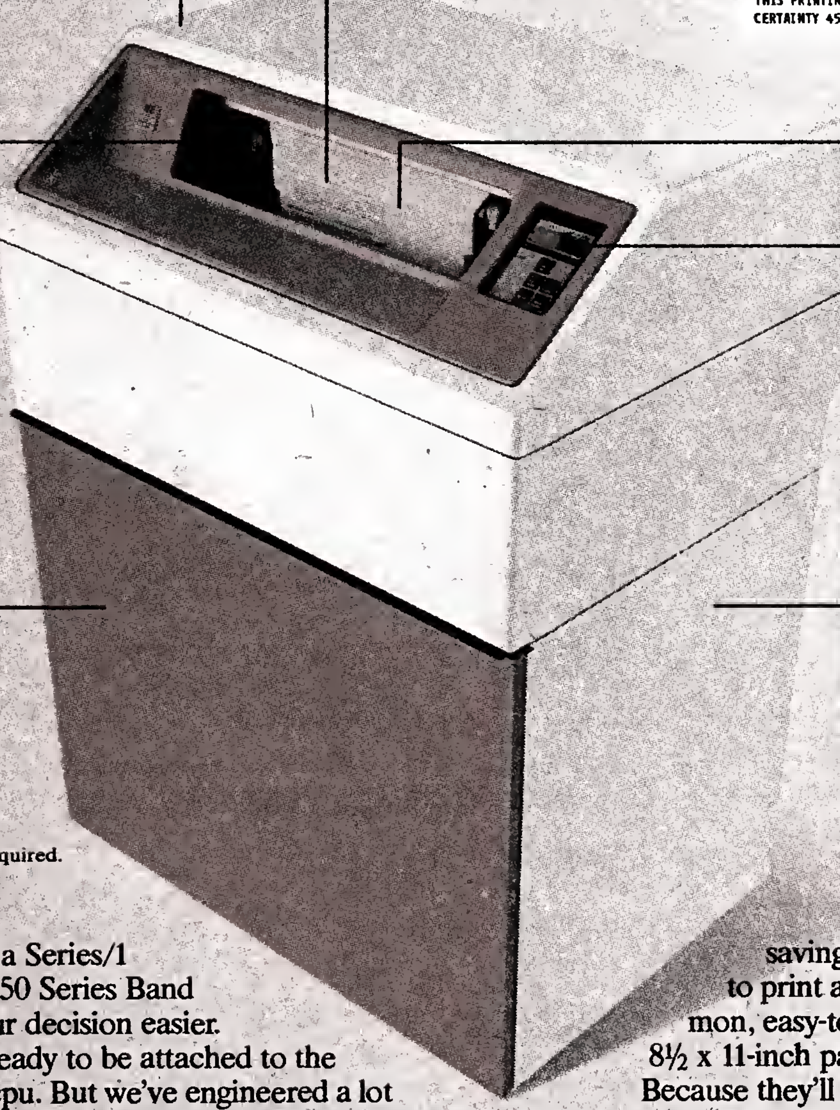

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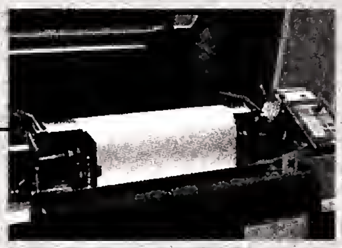

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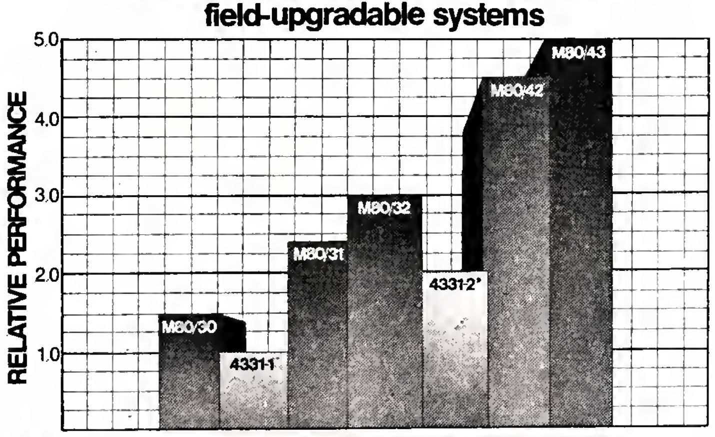

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2902 Orchard Park Way, San Jose, CA 95134 a so-called "hand-eye system," allowing robots to "see" and differentiate objects from one another.

The vision system looks at black-and-white images on a high-contrast scene. By analyzing them in two dimensions, the system can reportedly identify and sort objects of mixed types. The system is said to be usable for materials handling as well as assembly tasks.

Teaching the system, which is controlled by a DEC LSI-11, is simple. "You show it that this is a widget and this is a gadget," explained Earl Sacerdoti, MIC's director of research. "You show it to it five or six times in different positions with different fields of view and then it 'knows' it.

"The underlying techniques that it uses to do object recognition," he explained, "are very standard artificial intelligence pattern recognition techniques."

Whatever the uses or users, the benefits of robotics are uniform and clear: Improved quality, efficiency, precision and consistency are cited again and again by those who have taken the plunge.

That, of course, is the view from the top of the corporate ladder. What about the thousands of workers whose jobs will necessarily be eliminated by robots? GM's plans to acquire as many as 15,000 robots by 1990 will eliminate an estimated 28,000 to 30,000 jobs now performed by humans.

The issue has not been totally ignored, according to GM's Cocroft, who predicted that attrition would take care of some of the job loss, while some workers will be retrained to perform robot and computer maintenance.

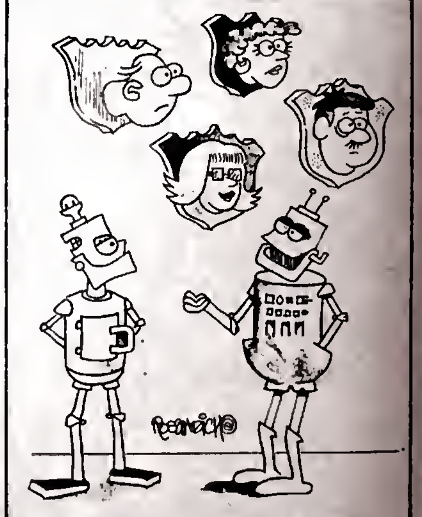
No one can promise that displaced workers will be taken care of — one way or another — but history has shown that a new technology somehow eventually manages to blend into the fabric of existence, resulting in irrevocable changes, both good and bad, that are impossible to stop. The attempt would be foolhardy.

Of no consolation at all to victims of technological progress will be the fact the machines over which they watch, or which have replaced them, are actually extremely stupid. AI researchers and potential users now realize that it is not necessary to have human-level intelligence in a machine to create a useful product.

However, at least that knowledge may help dispel the image of the superior robot in human form, ready to control the controller and perhaps even the entire world. As Sacerdoti is fond of telling his lecture audiences, "Look — computers are really stupid. If we can make a computer as smart as a chicken, it will be much more useful than what we have today."

Courtesy IBM

A scientist at the IBM Zurich Research Laboratory lowers an experimental Josephson memory chip into a container of liquid helium for testing.



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Cuts On-Hand Inventory

Application Tool Boosts Service Level by 25%

POUGHKEEPSIE, N.Y. — A 25% increase in its service level and a corresponding decrease in on-hand inventory were achieved by Alfa-Laval, Inc., here through use of an applications development tool called User Files On-Line (UFO) from Oxford Software Corp.

"With what I have been able to set in motion for near-term application of the computer, there is no doubt that our division is going to contribute more to the company's bottom line in the future," Robert E. O'Leary, operations manager, said.

Alfa-Laval is a worldwide company headquartered in Sweden with sales of about $1.5 billion. It markets centrifuges, heat exchangers and various other products and systems to the food, marine, chemical and other industrial markets, as well as farm-related equipment to the dairy farm market.

Expenses Down, Service Up

As operations manager for the parts and service division of the industrial group located in New York, O'Leary is concerned with minimizing inventory expense while maximizing response to customers. "We have been able to increase our service level from 70% to 95% with a significant decrease in on-hand inventory. Expenses are coming down while service is up," he said.

Managers need quick response and accurate information now — not when the programmer gets the program debugged, O'Leary said. "What happens if you end up 'firefighting' all of the time and [are] not solving the basic problem?"

In 1974, the company recognized the need for an on-line order entry system that would keep track of customer orders, parts on hand, parts on order and would identify supplies that needed to be ordered. This information would be used to manage the spare parts division more efficiently.

"Although the idea was proposed many times, the system was never written. We tried going outside, but the standard packages just did not fit our requirements," O'Leary said.

It was decided to develop an order-entry system to meet the company's specific needs; use the existing inventory control package; buy packages for accounts receivable, accounts payable, purchase order and credit; and use UFO to link them together. "UFO allows us to take a batch system and use it as though it were on-line," he said.

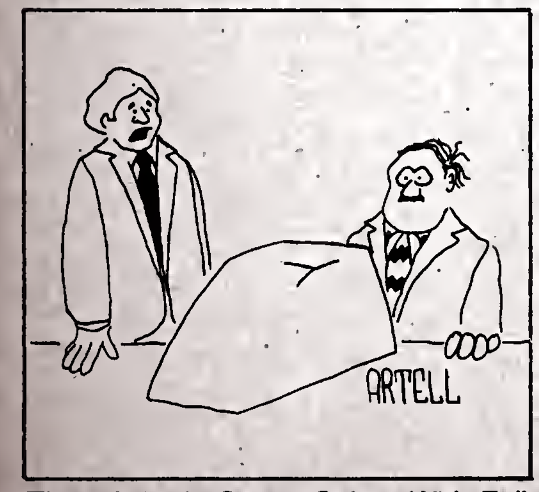
UFO was installed in the fall of 1981. The systems people were trained on UFO and currently are creating an order-entry system, he said. "We are going field by field, developing edits to ensure that orders are entered properly, that all departments who need information will get it and that files will interact with the proper departments and other files."

O'Leary began to "play with UFO" and in a few days was able to create on-line programs to inquire into batch inventory and requirements files. "A month ago, I had a terminal installed in my materials management department to use the inquiry programs I created. A few weeks ago, I had another terminal put in my office and I [have been] busy creating reports and using the system to identify problems before they happen."

He said UFO cuts redundant activities in developing programs. Filling in the blanks of the UFO screens, fields are defined in a file and then can be copied from one program to the next.

In marketing research, a customer order data base existed that dated back to 1947. "Now that we have the capability to create on-line systems quickly, we can analyze that information against current activity to determine, for example, which capital customers are now buying parts from us, which are not and why," O'Leary said. "If we could find out the answers to these and other questions, we might significantly increase sales.

"I think computers have been in the exclusive hands of the people who run them quite long enough. It is time to put them into the hands of the people who need the power of computers, the end users," he said. "For me, the computer has become a significant tool instead of an obstacle. I am sure that once other department managers under pressure find out that they can easily make the computer do what they want it to do, we will see a real surge in sound management ideas."



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Growth-Oriented Electronics Company

INDIANAPOLIS — What happens when a company has to upgrade its computer environment to accommodate applications for a new subsidiary?

Regency Electronics, Inc., a growing manufacturer of electronic communications equipment here, faced this problem in order to provide order entry, billing and inventory control applications for a new division.

Stymied by the thought of its first data base application, the company's small DP staff established ease-of-use as the major prerequisite when they launched a search for a data base management system (DBMS) in tune with their specific needs.

With projected sales of $70 million for 1981 and six operating divisions in five states, Regency has been cited as the number one growth corporation in the U.S. with sales under $100 million. The company's diverse product line includes FM business transceivers (two-way radios), monitor radio scanners, electronic test equipment, devices for regulating energy usage and marine communications equipment.

A decision was made to use IBM's IMS DBMS when the company converted to an IBM 370/148 computer under OS/VS1 in May 1979. But when little progress had been made, it was clear that IMS was unsuited to an integrated approach.

Tom Lontz, Regency's director of management information systems (MIS), recalled the frustration. "How was a shop with two programmers of little data base experience supposed to make a product run that required a whole file cabinet of documentation? We were constantly swimming in a sea of words."

IDMS Selected

With the aid of its public accounting firm, Ernst & Whinney, Regency did extensive evaluations of DBMS packages that promised ease-of-use, processing efficiency and integrated facilities. Ernst & Whinney insisted on a fourth criterion — availability of a data dictionary with the DBMS.

The data base consultants recommended two finalists, and after presentations by the competing firms, Regency selected Cullinane Database Systems, Inc.'s Integrated Data Base Management System (IDMS). "Based on our understanding of the products and their capabilities, we believed we would be more successful and in a better support position with Cullinane," Lontz said.

For Arthur Strahla, vice-president of finance and the man responsible for making the decision to go with IDMS, the dictionary was the clincher. "I'm no data processing expert," Strahla acknowledged, "but what convinced me of Cullinane's superiority was the Integrated Data Dictionary [IDD] and what it would mean for us down the road, as a way to automatically document everything we do in data processing."

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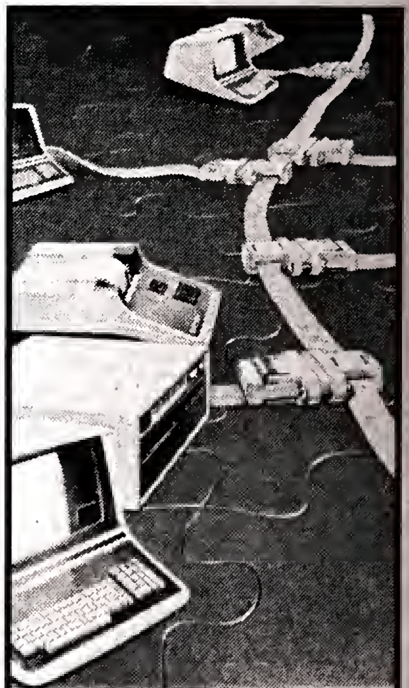

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Switches to IDMS With Data Dictionary

The final decision was made at the end of August and by mid-September, the IDMS was installed. "We had one manual and an 'Introduction to IDMS' course here on-site that lasted less than two days; that was the sum total of our education," Lontz said. "Three weeks later, on Oct. 10, we went into production with our first applications, using 15 record types and 87 Cobol programs."

Systems Operational

By December, Regency had implemented its inventory management/requirements planning application and followed that with the accounting functions (payables, receivables, general ledger). When the payroll system was brought up in February 1980, every system needed to drive the corporation was operational.

He described Regency's computer operations as "centralized mode with dispersed data entry." Because it is a truly integrated system, no data entry ever has to be made twice.

A corporate data base is maintained at the Indianapolis headquarters and the other divisions use minicomputers to enter their data and submit jobs remotely for execution. One data base structure represents all their applications, including parts master, product structure master, order entry, customer master, purchase order, accounting and payroll.

Impact on Productivity

IDMS was chosen for ease of installation and use, Lontz said. When the company monitored the software performance, the statistics were extremely favorable. "We had a credit-approval job that we ran three times a day at 15 minutes a run under Isam; it was 30 seconds a run with IDMS," Lontz said. "We spent a week double-checking that application under IDMS because we couldn't believe the incredible reduction in execution time."

Processing efficiency was also demonstrated in other ways. Regency runs all online activity through IDMS. This includes 15 terminals under Altergo Software, Inc.'s Shadow TP monitor. In addition, there are always at least three batch jobs running concurrent with the online activity. Despite this, response time has remained consistently at a half-second. He noted that IDMS has proved most beneficial to Regency as a productivity tool. The firm has gone from a company with two divisions and $35 million in sales to its present status with virtually the same DP staff.

Effect on Departments

Freed from such considerations as file reorganization and keeping track of record pointers, which IDMS maintains, Lontz is able to push far more production through the computer room and the effects of this productivity are felt throughout all user departments, they said.

Credit manager Bill Atkins noted that before the accounting functions went online in February 1980, he had planned to hire three people for various manual tasks. Now his staff is far more productive even with a greater work load and the only addition to his staff was someone to fill in for breaks, illnesses and vacations.

"My collections personnel used to spend as long as five hours a day on credit approvals alone," Atkins said. "That now takes as little as an hour, with the rest of the time devoted to collection calls."

For purchasing manager Nolyn Taylor, it is a matter of being able to approach Lontz with a request and know that it will be implemented. It might be a simple thing like providing a daily total of purchase order activity or something more sophisticated, like a parts-shortage list, by which "Tom brought me 60 days of expediting time that I didn't have before."

By entering purchase and change orders on-line, Taylor expects to reduce paper handling in his department by at least a third. He has been able to use the same size staff for an increased work load because the system under IDMS enables his people to do "smarter work."

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Easy-to-Access System

Car-Pooling Paper Chase Leads Lab to DBMS

LIVERMORE, Calif. — The "share-a-ride" concept was adopted at Lawrence Livermore National Laboratory here in 1977. Along with saving energy, however, the program brought an increased volume of record keeping and information tracking that eventually led to a call for a data base management system (DBMS).

Lawrence Livermore is the major employer in a rural area to which employees commute daily from as far away as 60 miles. Because it is not located in a major business center, many public transportation options are not available.

Early in 1977, a transportation committee was formed at Lawrence Livermore to address traffic and transportation problems. It became obvious that a commuter coordinating office could be of great benefit to employees, particularly after the gasoline shortage, according to transportation coordinator Diane Taasevigen.

Transportation Options

The two transportation options were a subscription bus service operating nine vehicles, or a small car pool system that had fallen into disrepair. The car pool system, initiated in 1973, managed information on existing car pools with the laboratory's Control Data Corp. 7600 computer, she explained.

The computer was designed for scientific applications, utilized Fortran and required the user to have significant technical knowledge. Coding was time-consuming and required extensive technical support. The system was impractical because of the time needed to keep the program active with current and accurate information, Taasevigen said.

She noted there was dissatisfaction with the quality of service provided by the subscription bus service. Laboratory Transportation Office (Labtrans) personnel felt that promoting the bus service would cause the bus management to improve their equipment and service.

To promote the service required sending marketing material to potential riders. This process was cumbersome because sorting employees by home address had to be done manually, she continued.

A new ride-sharing effort, therefore, was launched in 1977 by Labstrans. Its main purposes were to alleviate problems with parking lot overflows and to relieve Lawrence Livermore traffic congestion caused by the 7500 employees, Taasevigen said.

Key Objectives

The principal Labtrans objective was to find an easy-to-access computer system that would store and retrieve information on car pool formation and maintenance. The system needed a capability to respond on-line to individual requests, to requests for marketing information and to requests for management reporting, while keeping personnel and computer costs to a minimum.

She outlined specific objectives, which included on-line data entry and maintenance of information, immediate reporting access, the ability to produce distribution lists and mailing labels, a limited training requirement and quick setup and operation and batch processing.

In mid-1977, Labtrans contacted the personnel department at the laboratory, which had replaced their old computer system with a new subscription computer network service. Personnel's need for a flexible and easy-to-use method of handling data led them to Nomad, a product available from National CSS, Inc., Taasevigen said.

Nomad answered the needs for employee record maintenance for the personnel department and it felt the ride-sharing group could also successfully apply the system to their needs, she explained. The DBMS also was able to interact directly with the employee records in the personnel system, which cut the time and cost of entering data.

The company needed sufficient information to identify a pool and its members, but not to include useless information. Taasevigen said three forms of records were identified for the car pool data base. These include the employee record, the pool record and the Zip Code (grid) record.

Employee records had to be created

(Continued on Page 48)

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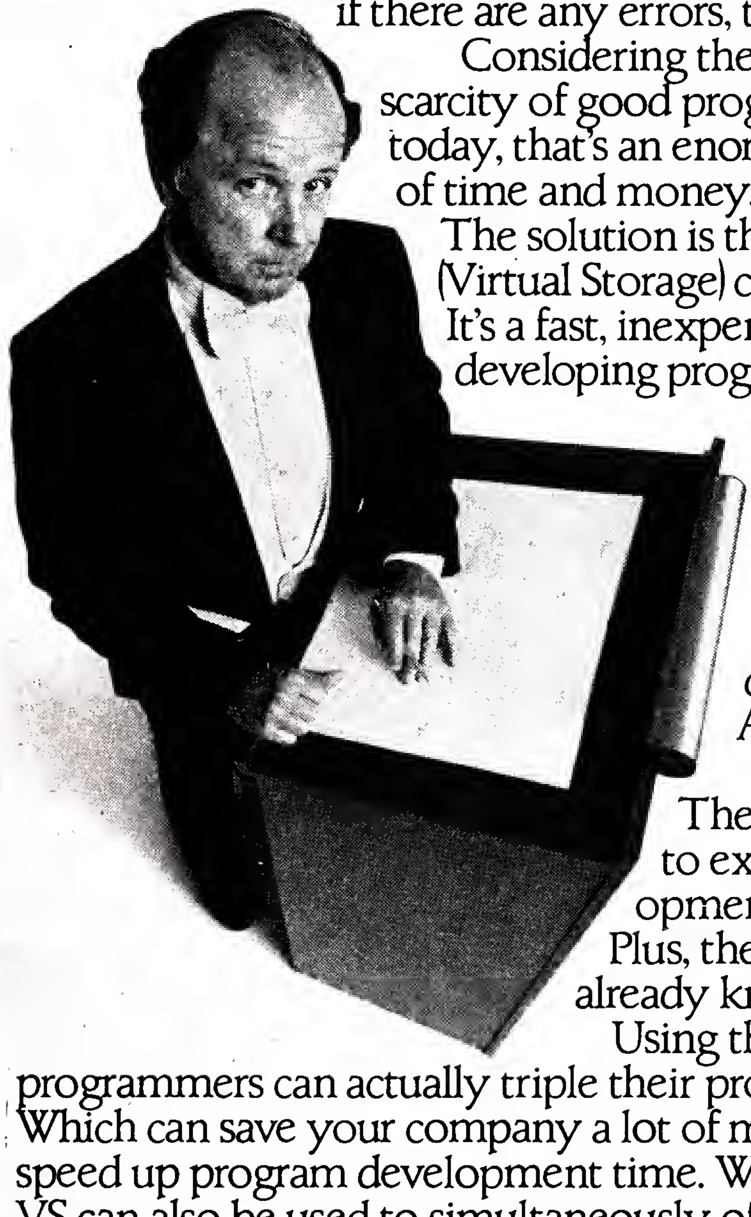
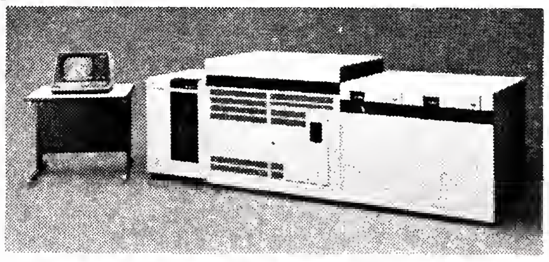
Using the Wang VS, programmers can actually triple their productivity. Which can save your company a lot of money, and speed up program development time. What's more, the VS can also be used to simultaneously off-load selected programs from your mainframe. You can even get Wang Mailway™ electronic mail and message system and Wang word processing—#1 in the world.

So find out more about how Wang can help your programmers become more productive. It's one decision you won't have any reservations about.





Wang VS Computer.

For a demonstration of the Wang VS computer, call
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(in Massachusetts call 1-617-459-5000, extension 5711). Or send this coupon to:
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A171

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Car-Pooling Paper Chase Leads Lab to DBMS

(Continued from Page 47)

in such a way as to be specific and no employee record could appear twice. Required items for this record included employee number, street and city address, Zip Code or grid, work hours, site location and rider status.

Included in the pool record was pool number, size, capacity, date formed, arrival and departure times, if smoking was allowed and the grid number, which included the street name and number.

A Nomad command, PROMPT, was used to prompt for all the necessary pool information, Taasevigen said.

The "Car Pools by City" report includes car pool information based on employee, pool and grid records. This information can be sorted by pool number, alphabetically by employee name and by arrival time and items can be counted, averaged, totaled and otherwise arranged and reported, Taasevigen explained. Reporting can be as simple or complex as is desired.

Van Pool Program

The Labtrans system is constantly undergoing adjustments, refinements and improvements and major system changes are usually made with the advent of a new project, according to Taasevigen. An example of this is the van pool program that made its debut at the Laboratory in 1978.

She said the van pool offered a more energy-efficient mode of transportation, which was easy on the budget and saved the family car from excessive commuter mileage. A coordinator/driver either buys or leases a van and drives it in exchange for a free ride to work. The total expenses of the van's operation are then shared equally by the remaining passengers.

With the advent of van pools, more information was needed to adequately do placement and tracking of these larger pools, she said. This included keeping information about the vehicle, including fuel capacity, range, type and insurance information, along with other items.

A routine set of procedures is run each month to give status reports on the program. Included are ridership levels in either car pools or van pools, increase or decrease in the number of pools and fuel use. Again, the operator types in the request and only the desired information appears on the report.

Equipment needed to use the subscription network computer includes a computer terminal and a telephone. The computer company (in this case, National CSS) is contacted, the customer is given an identification number, instructions are given on how to use the system and the operation is set up, Taasevigen reported.

Call for Papers

TRENDS AND APPLICATIONS 1982: ADVANCES IN INFORMATION TECHNOLOGY, Gaithersburg, Md., May 27, 1982.

This conference is being jointly sponsored by the National Bureau of Standards, the Institute for Computer Sciences, the IEEE Computer Society (Washington, D.C., chapter) and the IEEE Washington, D.C. section. They are seeking papers on information technology developments impacting the 1980s. Specifically, the committee is interested in new and advanced developments in the areas of advanced computer architecture, advanced graphics technology, distributed processing, office automation, networking, software and data base management. Papers dealing with evolving applications or societal impact are also welcome.

Three copies of a 1,000-word abstract are due Dec. 15. Notification of acceptance will occur on Jan. 30 and camera-ready copy is due by March 30. Abstracts should be directed to Leon Scharff, Adepso, Department of Navy, Washington, D.C. 20376.

INTERNATIONAL COMPUTER PERIPHERAL EQUIPMENT AND SOFTWARE EXPOSITION, Anaheim, Calif., Sept. 29-Oct. 1, 1982.

The deadline to submit technical papers for presentation at this event has been extended. Contributors are invited to present unpublished works on technology, product description or applications in the following or related areas: random-access storage, CRT terminals, printers, data communications and software.

Abstracts are due by March 26, 1982, and should include author's name, title, company, address, phone and telex. They should be addressed to William Ashman, Program Coordinator, Peripheral '82, Cahners Exposition Group, 222 W. Adams St., Chicago, Ill. 60606.

MILCOM '82: THE 1982 INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE) MILITARY COMMUNICATIONS CONFERENCE, Boston, Oct. 17-20, 1982.

Papers are being sought on aspects of military communications, with an emphasis on spread-spectrum communications. Possible specific subjects include: spread spectrum theory, technology, antijam systems, multiple access, synchronization, electromagnetic compatibility, satellite-borne equipment,

Notice of intent is due by Jan. 1; complete manuscripts and abstracts are due March 1. Five double-spaced, typed copies of the manuscript and a one-page abstract should be sent to Dr. Fred Ellersick, Communications Division, Mitre Corp., Bedford, Mass. 01730. Author's name, address and phone should appear on first page.

SIXTH WESTERN EDUCATIONAL COMPUTING CONSORTIUM, San Diego, Nov. 18-19, 1982.

Authors are invited to submit papers on computers and computer applications in any area that is of interest to instructors and administrative personnel dealing with computers at the college or university level.

Two copies of the original papers should be sent no later than March 1, 1982 to Prof. Grant at the Center for Information and Communications Study, California State University, Chico, Calif. 95929. Papers should be double-spaced, approximately 1,500 words long, and title page must include author's name, address and phone. A brief abstract should precede the text.

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Q. Can I be confident the Recovery Center will work?

A. You can if you can demonstrate to yourself and to your management that you have a tested backup capability that runs your critical applications. SUNGARD subscribers have conducted over 600 successful tests of their backup systems. Their early and continuous testing has the support of our technical professional staff, which has the skills and experience to make that job easier.

Q. How are tests supported?

A. At SUNGARD, they're supported with qualified technical SUNGARD personnel from every appropriate discipline. If you don't think you need experienced technical support (software, telecommunications, operations) to achieve a testable backup capability, you may have too many people on your staff.

The experience gained by a Recovery Center staff in supporting customer testing improves your ability to develop an effective capability. The absence of that experience (or worse, the absence of a Recovery Center staff) has the opposite effect.

Q. Can I back up my critical networks?

A. You can at SUNGARD. Our most effective answer to this question is the many users who have a tested capability today at SUNGARD. Non-believers are converted by a visit to our centers. At our Philadelphia Centers, we have in place and operational more than 150 modems of various manufacturers. Dial backup units, central office connections, cabinets, cabling and over 100 3705 ports are in place and operational. All these elements for network backup are interconnected through a Network Control Center which allows for rapidly customizing the capability to the unique requirements of each user. And all these elements (except the modems) are in our basic price. If you can't back up your on-line systems, you haven't accomplished anything.

Q. Is the hardware adequate to my needs, current and compatible, or is it "tired iron"?

A. You shouldn't sign for a 370-based backup system when you already have the 3081 in your plans. The 165 is unsupported now. What IBM version of the SP will leave the 168 behind? At SUNGARD we have current IBM hardware installed and a firm commitment to the 3081. We replaced our 168 in 1979. And we're committed to remaining current, not only with processors, but also with peripherals.

Q. Is the facility itself suitable and secure?

A. Each of the three SUNGARD Recovery Centers has an average of more than 30,000 square feet dedicated to supporting the recovery needs of SUNGARD subscribers. This includes, in addition to the backup configuration, a ready-conditioned space in each center with sufficient cooling and power for a replacement 3033 and associated peripherals. Four thousand square feet of office and terminal space is equipped with power and telephone jacks for your recovery team. And the entire facility is secured with a controlled access system and fire detection and protection systems you should expect in a first class center.

Sungard™ Centers have the answers.

Q. Who are the other subscribers, and are they satisfied with their Recovery Center?

A. As a SUNGARD subscriber you will have the right to know who the other users of your backup center are. As a SUNGARD prospect we'll share with you the names of Fortune 500 Industrials and Fortune 200 Financial institutions which have agreed to let us refer you to them to help you evaluate SUNGARD. You'll recognize the names and appreciate their serious commitment to providing the best available Recovery Centers for their installations. Our subscribers can report to their management with confidence that they have a tested recovery capability that works.

Q. What is the true cost of having a Recovery Center to go to in the event of a computer disaster?

A. We're the high-priced spread, but you get much more with SUNGARD. Our standard offering includes everything you need, so your cost with SUNGARD is very visible. Hidden costs to make other centers usable, especially network backup, can drive their price past ours.

We think that a workable disaster recovery solution is part of the cost of doing business in today's computer-dependent world. When compared with other accepted costs of doing business, your monthly recovery fee at SUNGARD is:

- Less than the cost of a security guard around the clock.
- About half of what you pay for monthly maintenance on your processor.
- Less than one string of disk drives or bank of tape drives.
- The equivalent of about $1.50 per square foot per year, including equipment, test shifts and technical support.

Q. Are there other costs?

A. Not for the SUNGARD Recovery Center. There is obviously cost associated with developing and maintaining your recovery capability. Our contingency services organization can bring its experienced staff to your site, to assist you in the development of that capability at your option. But the cost of having a second site at SUNGARD, including ample test shifts and extensive network backup equipment, is all in our basic fee.

Q. Can I test remotely?

A. Yes, you can. Our plan includes the ability to run your backup system without sending your recovery team to the SUNGARD Center. We still suggest that you come to the Center once a year to test, in order to remain familiar with your second center.

With remote testing and the opening of our third SUNGARD Center in Chicago in December, and our West Coast and Southwest Centers planned for 1982 and 1983, distance should not be a significant factor. And this network of SUNGARD Centers offers you added protection in the event that your primary SUNGARD Center is occupied by another subscriber experiencing a disaster.

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EDITORIAL

Users Burn as FCC Fiddles

Data communications users have had to put up with the high error rates and low bit rates of analog local loops for years. Now, digital termination systems promise to solve the problem by providing wideband, all-digital microwave channels that can put up to 1.5M bit/sec on each user's doorstep. The "last mile" of the transmission path will be a broad superhighway instead of a narrow, rutted lane.

However, before DTS can be deployed, the prospective suppliers have to obtain construction permits and operating licenses from the Federal Communications Commission. And before that can happen, a number of questions must be answered. The one that appears least amenable to solution concerns competition — specifically, whether telephone carriers should be allowed to offer DTS in any city where they own the local exchange network.

Two prospective DTS carriers — Tymnet, Inc. and MCI Telecommunications Corp. — want the commission to resolve this issue before it gives a green light to two others — GTE Telenet, Inc. and ISA Communications Services. The former company is a subsidiary of the nation's largest independent telephone company; the latter is about to be acquired by United Telecommunications, Inc., the second largest independent.

United has already objected to any delay and GTE Telenet probably will do likewise. A protracted cat and dog fight appears likely. Meanwhile, data communications users will have to make do with those analog local loops.

Last April, when the FCC decided to establish DTS, it considered whether to address the telephone company entry question, but decided to defer the whole matter because of the "unique issues" presented and the fact that these issues were not "well covered in this docket."

Ever since the First Computer Inquiry began in 1966, the commission has been considering the anticompetitive impact of allowing telephone companies to enter new markets. If the documents accumulated in this and related proceedings were piled on top of each other, they would probably reach to Mars. Of all the issues now confronting the FCC, this one probably least deserves to be called "unique."

It is controversial, of course, and that may be the real reason the commission is stalling.

DATA PAST

Ten Years Ago
Nov. 24, 1971

LAS VEGAS — Almost all the people thought computers were affecting every person in the country, and many thought the government would regulate the use of computers.

A survey conducted by *Time* magazine and the American Federation of Information Processing Societies revealed that 91% of the respondents felt that computers were affecting the lives of all of us.

— — —

LAS VEGAS — Potter Instruments Co. led the new product announcements at the Fall Joint Computer Conference with a working plug-compatible 3330 replacement drive that interfaced directly with IBM's 3830 controller. The disk storage system, the DD4330, was both cheaper and faster than its IBM counterpart.

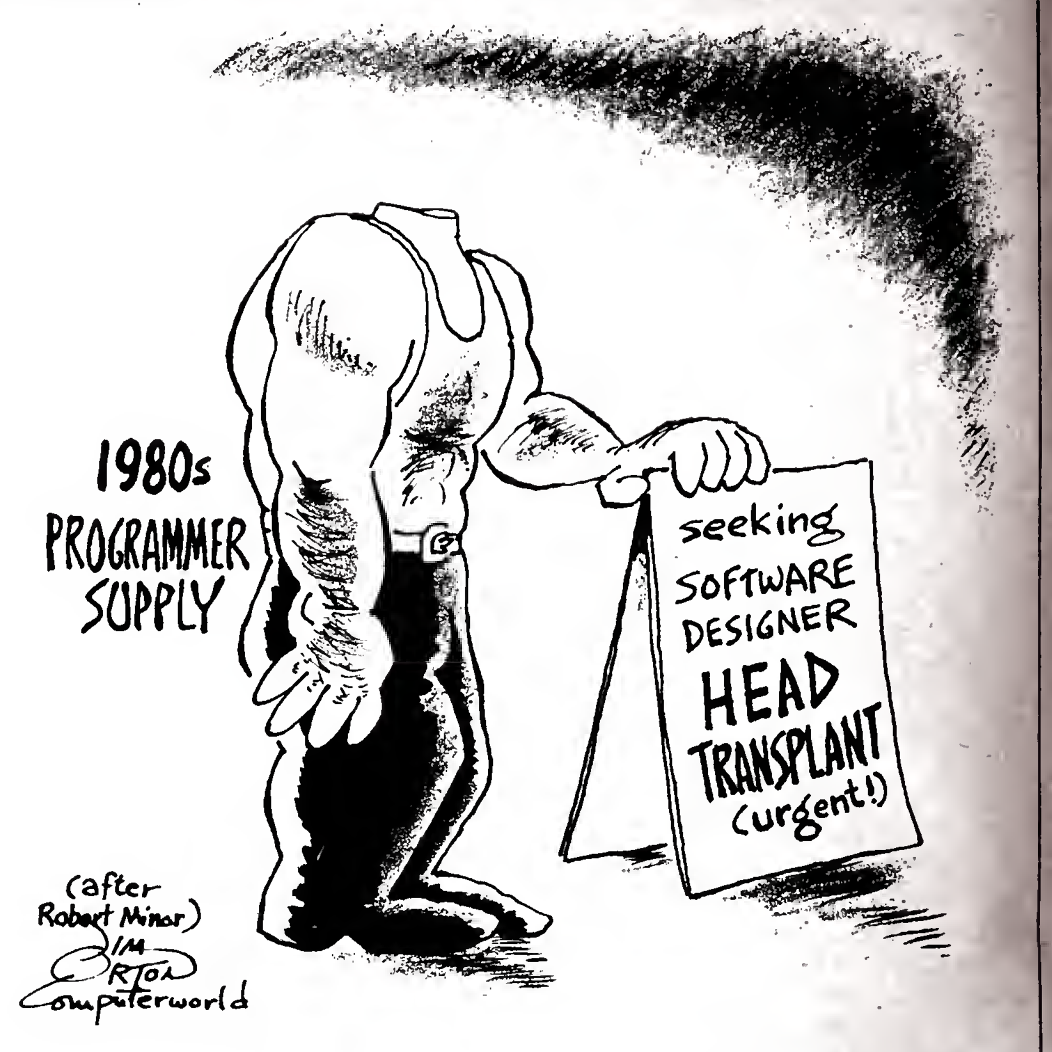
Five Years Ago
Dec. 6, 1976

WASHINGTON, D.C. — The Federal Communications Commission (FCC) opened the door for AT&T to tariff its Dataspeed 40/4 CRT terminal for interstate users.

In a notice issued late last month, the FCC called Dataspeed 40/4 service "not inconsistent with its existing computer rules" and announced its intention to "reverse" a previous decision by the chief of the Common Carrier Bureau on the matter.

— — —

HANOVER, N.H. — Computers have warped the founding fathers' idea of checks and balances in the American political system, according to Dr. Frank Ryan, director of information systems for the U.S. House of Representatives told a symposium at Dartmouth College here.



LETTERS

Proposed Cobol Standard

In reference to the article "DPMA Takes Stand Against Cobol Draft" [CW, Oct. 26], it seems both extremely shortsighted as well as nearsighted of the American National Standards Institute (Ansi) X3 Committee to contemplate approval of a language standard that business not only will not, but in this economic climate cannot implement. To do this would show a ruthless disregard for their fellow professional practitioners and would seriously impair the credibility and future usefulness of the committee.

Standards are to be created to assist business in communicating and clearly a programming language that is not vertically compatible is not acceptable to the business community at large.

It is true that horizontal compatibility is a requirement for the balance of the '80s and '90s, but horizontal compatibility at the cost of vertical compatibility and obsolescence of current systems is unacceptable. And make no mistake about it, a move such as this would hasten the obsolescence of Cobol.

If business has to make a conversion of the magnitude this standard requires, my guess would be that newer, more efficient languages, which already have some horizontal compatibility would be the choice, such as Unix "C," Pascal and certainly Ada as it becomes available.

I don't know if any members of the committee represent service bureaus offering applications programs or large software package houses, but it seems likely that many of these would suffer critical, if not fatal, disruptions to their business.

Linda T. Taylor
Director
Information & Management Systems
Filmways, Inc.
Los Angeles, Calif.

DPer Shortage a Pipe Dream

I am a regular reader of *Computerworld*. I've read articles and more articles about shortages of programmers and other various DP skills. "Designer Shortfall to Plague '80s" [CW, Oct. 12] states there is a 20% shortage. I have in front of me another article that gives a 30% shortage and even another that gives it as 37%.

My opinion of these figures is that they are poppycock dreams or hallucinations. I've been in DP for nearly 25 years, so I speak from experience.

That's the way I feel about these so-called experts who quote the 20% to 37% figures with nothing to support their contentions. If that many jobs are going begging, then the management and hiring policies of a lot of companies are in need of an overhaul. To allow such figures to build reflects directly on poor planning and management.

If I had a company that was from 20% to 30% short in programmers I would fire my DP managers and personnel staffing specialists and get some people with vision and ability to do the job. But, since I don't believe those high figures (unless I am presented proof) I am inclined to feel they are thrown at you by "headhunting" shops, which tend to sell people rather than find the right person for the job. After all, the headhunter makes money on placements and not on whether it is a suitable placement.

Companies would be better off advertising for people who "have worked with or have related experience" rather than asking for a certain amount of experience and listing every qualification under the sun.

Let's face it, everyone who wants a job in DP is not cut out to be in DP.

Carl E. Young
Director of Industrial Security
Defense Investigative Service
Cleveland, Ohio

SOFTLINE/Werner L. Frank

Best Sellers in Microcomputer Software

In a recent Softline column [CW, Oct. 19], we summarized survey data reflecting the retail sales of software aimed for the microcomputer marketplace. The survey represented information concerning the top package sellers from each of the 38 responding software manufacturers.

We identified 142 individual offerings that were classified according to the following seven categories of software: Application (A), General Function (F), Utilities (U), Language (L), Systems (S), Games (G) and Education (E).

Close to 75% of the sample packages belonged to the categories Application and General Function. An application program performs a specific industry or cross-industry job such as general ledger or payroll. The general function program is really a general-purpose tool that can be used to perform a specified task, such as generating a document using word processing or retrieving data using a data management system.

Table 1 summarizes these two types of program offerings, which were identified as top sellers. Clearly the accounting and data management packages are the most popular. Accounting embraces the usual general ledger, accounts receivable, accounts payable and payroll function. Most of these offerings are cross-industry in scope, including several systems for general client write-up and administration. More vertically oriented software is also available, typically concentrating on the medical practitioner, including doctor and dentist. Another popular offering is on behalf of the realtor and property management function.

The 31 data management packages vary considerably in approach and capability. Most are really file management systems. Some, however, claim to have data base features. These products provide facilities ranging from a query and retrieval emphasis to a full processing capability. The user's assumed DP knowhow stretches from the casual to the professional level. For the latter case, there are data management capabilities that can compete in functionality with systems offered on large computers.

BREAKDOWN OF TWO CATEGORIES OF REPORTED SOFTWARE

Application Programs		General Function Programs	
Type	**Number**	**Type**	**Number**
Accounting	28	Data Management	31
Order Entry/Inventory	8	Word Processing	7
Billing	7	Spreadsheet	3
Investment Analysis	8	Graphics	2
Miscellaneous	3	Statistics	2
		Project Management	1
TOTAL	**59**	**TOTAL**	**46**

Table 1

A number of these packages have a high prompting facility so that responding to menus and answering questions defines a problem for subsequent execution. These systems are often called application generators.

Six of the reporting companies gave no sales information regarding their product offerings. For certain other products, which were only recently introduced to the marketplace, no meaningful sales data was available. We can, therefore, present sales statistics for only 32 companies and 106 of their associated products. This data is given in Table 2 and Table 3.

Table 2 summarizes the units sold by software category for the reported products. We note that the top sellers are represented in all categories except for Applications, with a surprising showing for the Games and Education entries. For the most part, however, applications and general

(Continued on Page 56)

NUMBER UNITS SOLD BY CATEGORY

Number Sold	Total Number	By Category A	F	U	L	S	G&E
Not disclosed	36	13	13	1	5	1	3
Less than 500	38	26	11	1	-	-	-
500 to 999	24	14	9	-	-	-	1
1,000 to 4,999	23	5	7	5	3	3	-
5,000 to 9,999	8	1	3	2	-	-	2
10,000 to 20,000	10	-	2	1	3	1	3
Over 20,000	3	-	1	-	1	1	-
TOTAL	**142**	**59**	**46**	**10**	**12**	**6**	**9**

Table 2

REVENUE GENERATED BY CATEGORY

Revenue Amount ($K)	Total Number	By Category A	F	U	L	S	G&E
Not disclosed	36	13	13	1	5	1	3
Less than $100	25	14	7	2	-	-	2
$100 to $499	48	21	17	3	1	2	4
$500 to $999	13	8	3	1	-	1	-
$1,000 to $10,000	17	3	5	3	5	1	-
Over $10,000	3	-	1	-	1	1	-
TOTAL	**142**	**59**	**46**	**10**	**12**	**6**	**9**

Table 3

READER COMMENTARY/Richard Shemtob

Should Audit Firms Provide DP Services?

The recent *Computerworld* article "Frugal State Pours Millions Down DP Drain," [CW, Nov. 2] was most timely. While the facts are currently neither fully known nor reasonably uncontested, there is a lesson for us all in the imbroglio that the story suggests. Basically, the story involves an independent auditing firm (Arthur Andersen and Co.) providing nonaudit services (DP consulting), and perhaps performing poorly enough to warrant national attention on top of state-authorized examination. The dilemma is this: In general, should audit firms engage in these nonaudit services and, specifically, should the DP community take a stand on their offering DP services?

The currency of the problem derives from the Securities and Exchange Commission's (SEC) proposal (S7-901) to eliminate the requirement that publicly traded firms report the extent of nonaudit services each year in the company's proxy statement. This is primarily because the SEC feels there is not a sufficient nonaudit service provision in existence to warrant concern about nonaudit service giving the appearance of a lack of independence to audit firms whose independence is their reason for existence. In 1977, the SEC decided after extensive comment not to bar audit firms from nonaudit service provision.

Complex Concept

Although independence is a complex concept not entirely familiar to the DP community, the provision of DP consulting by auditing firms is perhaps an impediment to the DP community's professionalism and technical prowess. Most audit firms garner DP consulting assignments with a generous helping hand from their reputations as expert auditors. That expertise is leveraged into consulting expertise often enough to pose a problem.

According to the article, the Andersen firm, as reported, showed a lack of understanding, knowledge and professionalism from a DP point of view. This can only serve to exacerbate the distrust and misunderstanding the DP community suffers from the general public and, more importantly, management, which holds their individual careers prisoner to management perception. The provision of DP services by audit firms siphons off DP personnel with superior people skills and communicative abilities and serves to worsen the marketplace from firms seeking capable DPers.

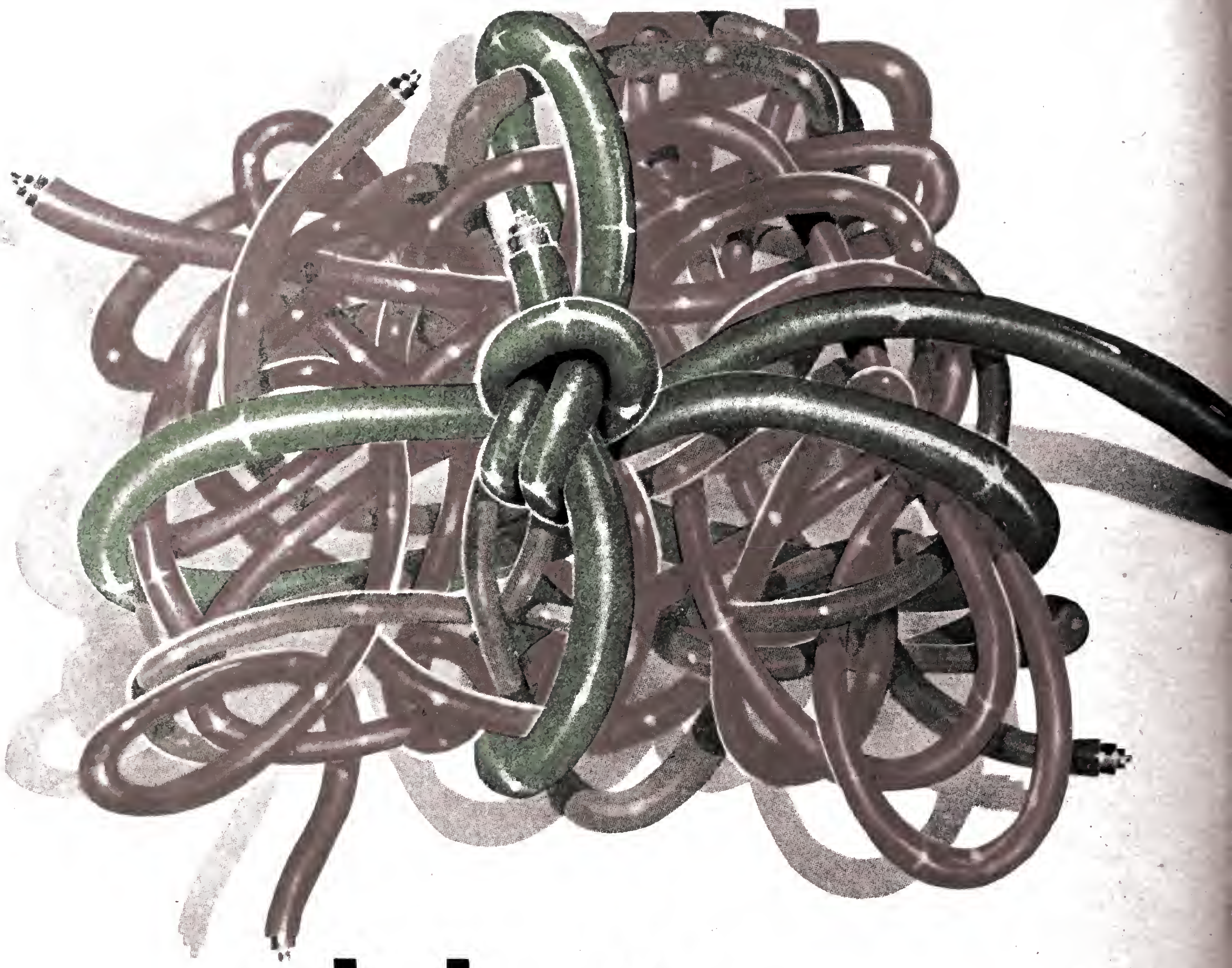
Consulting, a form of management-substitution, reduces the participation and the contribution that employees may offer to their employers. When consultants are engaged, it is often because somehow the internal DP staff is considered either overworked, incapable, inexperienced or unknowledgeable. The DP professional has a hard enough time overcoming mystique, misinformation and misperception of DP and its practitioners to also have to suffer the slings and arrows of outrageous fortune hunting by consultants, especially when their consulting performance hurts all, including themselves and their profession.

Lack of DP Comment

In reviewing the SEC comment files one should be struck by the relative lack of DP comment (about nonaudit services by auditors) and wonder why the DP community is not attending to its best interest — its employers' interest — by voicing the community's intelligent and cogent opinions in a timely manner. Too often, consultants learn the facts from the internal staff, do their reporting pursuant to management preferences, collect their gravy and leave the internal staff to sort it all out when — sometimes — it comes a cropper.

The guiding principle for evaluating the appropriateness of DP services from audit firms is the determination of how auditors become DP experts as well as audit experts. In

(Continued on Page 56)



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Bell Account Executives provide you with complete communications systems that can change shape to meet your moment-to-moment needs. These same systems can be easily modified, or accept new components to keep pace with the growth of your business and with changes in technology. And your service agreement with Bell protects your system against obsolescence.

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LETTERS

Solution Suggested

Jack Worlton's In Depth, ["Supercomputers," CW, Nov. 9], was most interesting and inspiring to me.

I suggest a solution to his request for a higher-level language than Fortran for computational physics: the APL language implemented on parallel-processing hardware. APL, designed to be an extension to mathematical notation by its creator, Dr. Ken Iverson, has in it all the parallelism that could be desired. APL has been given a bad reputation for consuming a disproportionate share of systems resources, but it has been implemented, to the best of my knowledge, only on serial processors.

Perhaps a parallel implementation of APL would serve to remove the language's ill-deserved stigma and provide scientists and engineers with a tool that might at once improve their productivity and nurture the state of mind that parallel thinking requires.

Ross Bettinger
Culver City, Calif.

DP Shortage Is Real

I wish to express my views on "The Programmer Shortage Is an Illusion" [CW, Oct. 5].

Having been a "headhunter" for the past five years I read the article with great interest. In fact, it was the talk of my office. Ethan Bortman's views on the contribution made by employment agencies to the programmer shortage are farfetched at best.

It is true that some employment agency representatives call programmers at work; in fact most do. If we waited for "job seekers" to call us we would all be out of business. Be that as it may, it is obvious that a job opportunity must exist before it can be "dangled" as Bortman puts it.

Somewhere out there are companies that need programmers. In all likelihood if they could fill their needs without using agencies they would do so. But many firms truly believe that agencies provide a valuable service. If this were not the case, the number of agencies in existence would dwindle.

I do agree with Bortman's contention that there are "pockets of programmers" ready to relocate. In fact, there are pockets of programmers willing to stay right where they are. Why relocate someone if you don't have to?

Bortman's choice of words is most interesting. His "in-house professional staffer" is nothing more than an in-house recruiter. In fact, many in-house recruiters have come from the agency folds. They know the recruiting techniques; why give them up?

On the other hand, Bortman's use of people from another country when there is unemployment at home leaves a lot to be desired. If, as he says, it costs the same to bring a person from England as it does to pay an agency fee, why not pay the fee and use someone locally?

Every time Bortman's company hires a new programmer (unless he is employing recent graduates), that person has to leave from somewhere. Bortman is, in effect, rewarding disloyalty, as is every other employer that lures a person away from another company.

The point is the programmer shortage is real and Bortman is being righteous if he thinks that his recruiting techniques are better than anyone else's.

Larry Cole
Employment Consultant
Computer Professionals
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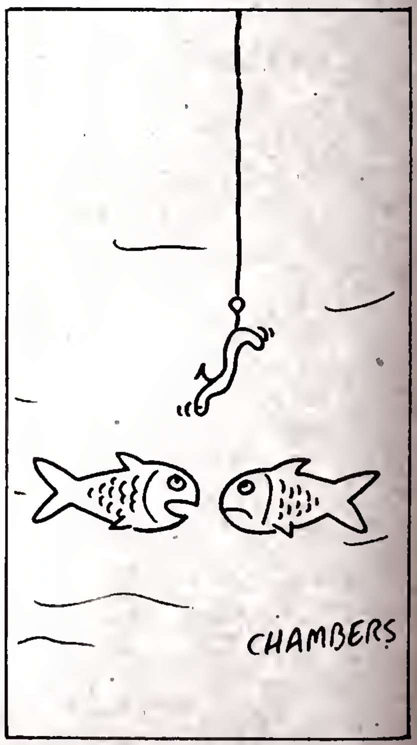

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Best Sellers in Microcomputer Software

(Continued from Page 51)

function software tend to be more conservatively clustered at the low range of sales achievement level.

Turning now to the revenue volume strata shown in Table 3, we note that there are high revenue producers in all categories except Games and Education, with the general function and language products taking the lead.

These results indicate that at least 20 products have achieved equivalent retail sales levels of more than $1 million. We deduce from the trade press stories that at least three products, Personal Software, Inc.'s Visicalc, Microsoft, Inc.'s Mbasic and Digital Research, Inc.'s CP/M have all reached sales levels of well over $15 million.

Software sales information for microcomputers, however, must be carefully treated. It is necessary to distinguish between actual revenues and equivalent retail or list price sales amounts. It is difficult, if not impossible, to estimate real revenue levels for the major participants in the software sales process: the author, the publisher, the distributor and the retailer.

Layer of Cost

First of all, each participant adds a layer of cost. More important is the fact that much of this software is offered in a bundled fashion.

For example, a publisher might well allow a hardware manufacturer to distribute a fixed number, or even an unlimited number, of copies of some piece of software in consideration of an appropriate front-end payment. Hence, the realized revenues of the software publisher for a specific product may well be less than one-fourth of the so-called composite sales of that product based on retail or list price.

Successful microcomputer software, like hardware, creates a subsidiary or ancillary market. For example, Visicalc has stimulated its own submarket. There are now several competitive products vying for the marketplace, such as Sorcim, Inc.'s Supercalc and Structured Systems Group, Inc.'s Visiclone.

There is also an independently organized user group called Visigroup with a membership of nearly 1,000. For $25 per year, members receive the periodical entitled "Spreadsheet." Visigroup can be reached through P.O. Box 254, Scarsdale, N.Y. 10583.

Frank is executive vice-president of Informatics, Inc. in Woodland Hills, Calif.

Audit Firms/ DP Services

(Continued from Page 51)

most cases, they do not. They are either one or the other. Yet they obtain DP assignments, which would (for the health of the employer) be the internal DP staff's province because the audit firm (not necessarily the individual audit firm hawker of DP services) is respected for audit ability.

The harm auditors do to their profession by failing in DP assignments is nearly as horrendous as the harm suffered by the clients counting on success and paying for failure. It is well to keep in mind that failure is not always total, not always acknowledged and not always as clear to management as it is to professional DPers. The size and extent of DP failures is unknown, but the probability that it is material (how auditors love the word material) cannot be overlooked.

I am not suggesting here that poor work is the hallmark of all or many consultants or audit firms. Fine work usually is the product of fine minds and good people. However, knowledge plays a vital role and it seems proper to question whether knowledge is transferred by legitimate means or simply by transferring labels.

Shemtob is a Certified Public Accountant and a data processing and management consultant.

LETTERS

Programming Ideas

I once worked with two similar programs. One program was much harder to understand than the other. Yet both had about the same number of instructions and percentage of branching statements — (but the more difficult one had a higher percentage of conditional branching statements).

The most obvious difference between the two programs was their structure: One program just cascaded from page to page, while the other program's logic resembled knotted spaghetti.

In publishing, the difficulty of a text can be measured by its "fog index."

Could an assembler or compiler produce a "complexity index" on the program it processes?

I believe a figure like this would be useful in the development and maintenance of programs.

Would anyone like to comment?

R.A. Sobieraj

Perth Amboy, N.J.

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- 22 Cursor controls, including set, read, save, restore and move 1 to N
- 12 Tab controls, including column and field tab stops, and tab with justify
- 13 Erase controls
- 12 Edit controls, including the ability to locally rearrange data on the screen
- 13 Send controls and modes, including Meta Key Mode for 8-bit data transmission
- 10 Print controls and modes, including local and remote copy, and print format control
- 11 Receiving modes, including slow scroll and pause
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MANAGERS, COMPUTERS & PRODUCTIVITY

An award-winning* account of RCA's experience with the **Iris** decision support system (DSS), **by Franz Edelman,** who designed the **Iris** system for managing information in the human resources area.

Productivity has become the No. 1 concern of American industry. The largest and fastest growing part of the labor force is the office, that most labor-intensive of all institutions. The vast bulk of office activity centers around managing information, in one way or another. The significant issue is, therefore, the identification and control of the organization's "total cost of information" and the most effective deployment of the resources dedicated to managing this information.

The traditional approach has been to address the white-collar productivity problem almost entirely through "cost displacement" systems, that is, systems explicitly designed and operated to mechanize manually performed and routine clerical tasks and, thereby, to replace expensive labor with less expensive machines. One purpose of this article is to provide a careful assessment of this approach.

The study reported here is based on measurements of actual business operations over a period of several years. It shows quite conclusively that value-added systems, designed and operated to support the managerial and professional activities of the firm, have the potential to improve white-collar productivity, in terms of greater effectiveness and lower costs of actual operations, as much as or more than cost displacement systems specifically designed for this purpose.

The implications of this conclusion are profound and far-reaching. They represent major opportunities for improved returns from the firm's investment in information resources in the 1980s and beyond.

Motivation: The Original Problem

By mid-1972, the management of RCA Corp. had concluded that some of its employee benefit programs needed to be upgraded. The company decided to begin this process by evaluating the then-existing retirement plan with the intention of making any required and/or desirable changes.

The corporate operations research group, which had existed since 1957 as a respected and credible analytical resource to corporate and operating unit management, was given the task of preparing the information required for this evaluation and subsequent action. Accordingly, a mathematical model of the retirement plan was built as a means for testing the current plan under a variety of external economic conditions and a number of alternative new plans that management might want to consider in the future.

Since the retirement plan has a great impact on current financial status and over the long term, in the actuarial sense, care was taken to model this process in sufficient depth and detail to yield adequate and reliable information with which to support this large and important decision. Even so, the model-building task proved perfectly manageable, since the relationships involved were all well-defined and relatively few in number, although some of them were quite complex. The difficulty encountered in productive use of the model — and thereby hangs the entire case study — related to data support of this straightforward model.

It soon became apparent that the standard procedure of using stylized statistical distributions, the well-known "bell-shaped" type of curves, for such major variables as population age and length of service was inadequate for the accuracy and reliability requirements of this task. What was needed for data support of this model was real information about real people in the various segments of this population, rather than relatively high-level statistical aggregations.

Consequently, the corporate industrial relations (IR) staff activity, which has overall responsibility for all matters relating to human

* *This article is based on the paper by Franz Edelman that won the first-place award in the 1981 National Paper Competition of the Society for Management Information Systems. The work was sponsored and funded by RCA Corp. while the author was its staff vice-president, business systems and analysis.*

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OBJECTIVES AND PRIORITIES

1. MANAGEMENT SUPPORT
    - ANALYSIS
    - POLICY DEVELOPMENT
    - DIRECT INTERACTION
2. CLERICAL/ADMINISTRATIVE SUPPORT
    - REGULAR TRANSACTION PROCESSING
    - STANDARD REPORTS
    - DATA INTEGRITY

Figure 1

resources management, requested the appropriate data from all of RCA's operating units, both divisions and wholly owned subsidiaries. It is important to note that RCA had, at that time, a corporate personnel data system (PDS) in place. However, this was installed at relatively few locations and even there a multiplicity of systems existed, usually one for each different major personnel application. The remaining units either used their own systems or depended on manual procedures.

Some 12 to 15 months later, toward the end of 1973, it had become apparent that this process of gathering vital data from operations to support a major companywide management analysis and decision was not working and would not produce the desired result. Much of the data that was being transmitted up the line during this period turned out to be, upon close scrutiny, inaccurate, out-of-date, incompatible, incomplete and generally insufficiently reliable to support such a critical process. Corporate management, therefore, decided "there had to be a better way."

As a result, at a meeting on Feb. 15, 1974, the corporate operations research (OR) group was invited to develop a more promising approach to such problems in general and to this one in particular and to submit an appropriate proposal to this effect. The OR group was, at that time, a part of the corporate management information systems (MIS) staff and was, therefore, a sister activity of the design and programming group, which was responsible for the existing corporate personnel system PDS. The latter group saw this extended charter granted to the OR group as a flagrant invasion of its territory, a reaction that is not entirely unjustified, the merits of the case aside.

This unusual situation was to have organizational and operational impact for years to come, some of which was most salutory. Specifically, it served to redirect the thinking in many of RCA's system activities toward focus on managerial support through effective business analysis, with the more-or-less routine and certainly essential DP back-office activities being viewed as a means to that end. Thus, the support of business activities, as perceived by the managers and professionals of the enterprise, became the first priority of the system activity.

The Vehicle – The General Solution

From the very outset, corporate management made it clear that the priorities of the new system, whatever its eventual embodiment, were to be twofold (see Figure 1). First, the system was to be capable of supporting the managerial requirements of the IR function on a companywide basis. This was to include personnel managers at the local level, for example, at a plant site, at the division or subsidiary level and all the way to senior IR executives in the corporate offices.

Specifically, the system was expected to "provide a facility for 'ad hoc' inquiry and analysis, which is at the direct and personal disposal of the IR manager on an interactive, on-line basis."

Second, the system was to be instrumental in providing all regular clerical functions and procedures required to assure continued integrity of all IR data in the system, in support of the managerial function above. In other words, it was taken for granted by the managers that the information function would create, maintain and operate a reliable, timely and orderly "back office."

But it was clearly understood that the back office was the means for attaining the top-priority objective: effective managerial support. While this priority ranking should not, and did not, come as a surprise, it was, nonetheless, the first time that it was so stated, explicitly and unambiguously, by senior management at the outset of a major system task.

This set of priorities led to four major design decisions, which will be reviewed here briefly to put the role of the system into proper context. (Additional particulars about this system are available in "Iris: A Transaction-Based DSS for Human Resource Management," by Paul Berger and Franz Edelman, in *Data Base*, Vol. 8, No. 2, Winter 1977.)

Design Decision No. 1: Data base management (DBM) technology would be employed. This was felt to be essential in order to:

- Create and maintain a single repository for all employee information with an absolute minimum of data redundancy.
- Guarantee effective data security and privacy to the individual employee and the operating unit.
- Provide a capability for system adaptation to changing business needs through automatic restructuring and extension procedures.

The last point was considered especially critical in order to reduce maintenance effort once the system became operational. The independence of all applications programs from data structure, which is one aspect of DBM, would eliminate constant patching, recompiling and retesting of these applications programs as real-world changes required modifications of the data structures. This result has indeed been achieved and has materially reduced maintenance costs.

In addition, design and documentation are also greatly assisted by the DBM approach and there is very little argument today about the overall desirability and benefits of the DBM concept.

Design Decision No. 2: The system's "front end," that portion visible to *managerial* end users, would utilize interactive computer technology and a strong human-engineered interface with managerial/professional end users, based entirely on an ultra-high-level language, also referred to as a fourth-generation or nonprocedural language.

An interactive front end provides data and the procedures for getting at and manipulating it on an on-line basis. Thus, if the particular task at hand is judged urgent enough by the manager to warrant the additional expense of immediate response, this option is available. Otherwise, results are always delivered on an overnight basis.

The nonprocedural language was to facilitate an environment in which managerial users would be entirely comfortable with the system at their command and in which they could begin to develop a perception of the system's direct and personal utility. In short, they were to feel that the system would be a distinct help to them in the execution of their day-to-day activities and responsibilities. The system's front end and, particularly, the nonprocedural language have more than lived up to this expectation, and Iris has become an indispensable day-to-day working tool of the managerial and professional communities.

Design Decision No. 3: The sys-

	12 MONTHS ENDING		PERCENT CHANGE	2/12/75 TARGET
UNIT COSTS *	12/31/80	12/31/79		
TOTAL COST / EMPL / YR ($)	7.45	7.34	UP 1.5 %	–
'REG.' COST / EMPL / YR ($)	4.03	4.09	DOWN 1.5 %	4.35
'AD HOC' COST / EMPL / YR ($)	3.42	3.24	UP 5.6 %	–
COST PER TRANSACTION ($)	0.03	0.05	DOWN 40.0 %	0.25
USAGE DATA				
NO. OF TRANS / EMPL / YR	14.1	16.7	DOWN 15.6 %	6.0
TOTAL NO. OF RECORDS (000)	136.6	120.7	UP 13.2%	–
TRANSACTION VOL. / YR (000)	1929.0	2007.0	DOWN 3.9 %	–

Figure 2. Iris Cost Performance

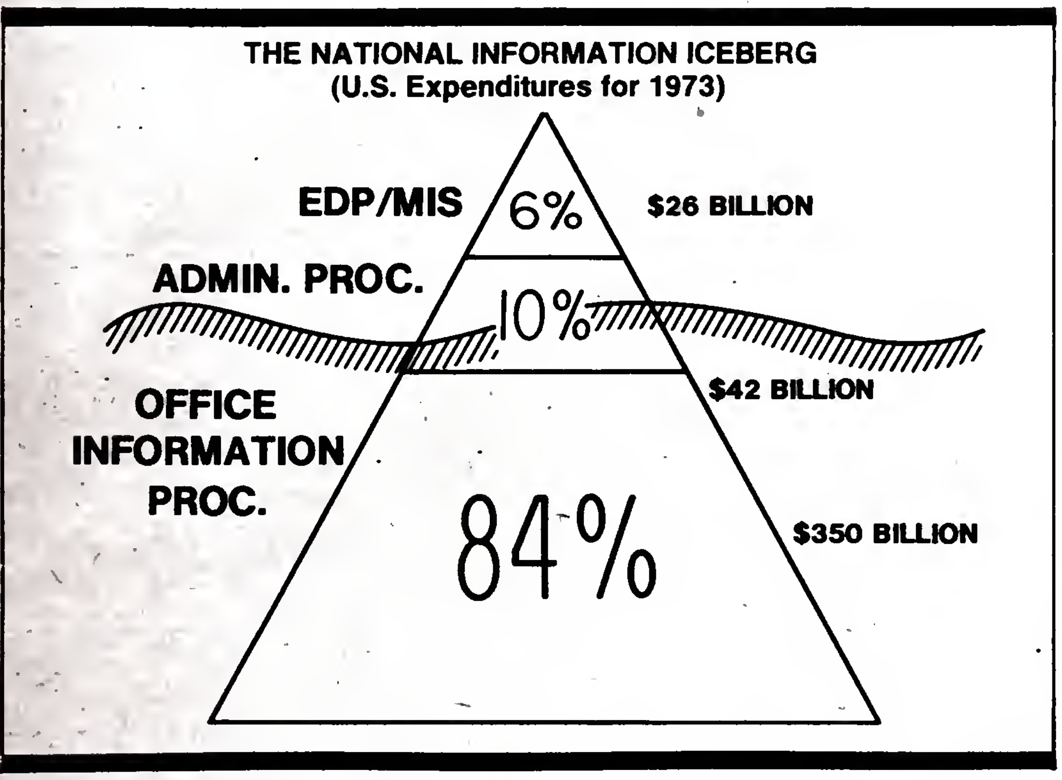

Figure 3

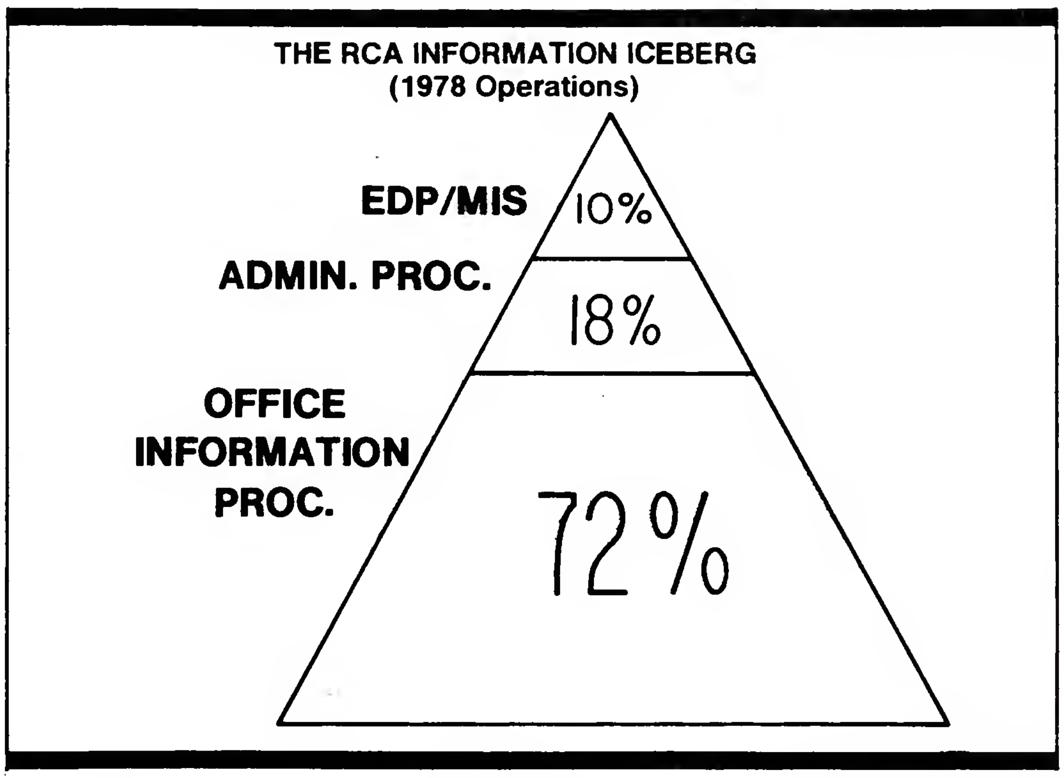

Figure 4

tem's "back office" — the portion that provides regular data base updating and maintenance, standard reports and all other routine periodic operations such as payroll — would utilize traditional programming methods, employing standard, middle-level languages (Cobol, for the most part).

For the sake of both safety and end-user comfort, it was decided that *all* updating of the data base would be accomplished through the back office, where proper validation routines could be exercised. The user of the front end may enter data changes at the terminal, but these are merely buffered there and are later added to the normal transaction stream for validation and entry through the back office. This procedure has added greatly to the data's reliability and to the feeling on the part of managerial users that they cannot inadvertently damage their data bases.

Design Decision No. 4: Instead of depending on "data extracts" as byproducts of other operating systems such as payroll, this management support system would be equipped to receive and process directly all transactions of a personnel nature. This decision was the most controversial at the time, since it affected the existence and operations of a number of other major systems then in existence.

On the other hand, this decision also turned out to be the one with the most overall impact and warrants the largest share of the credit for the system's successful implementation and operation. It guaranteed, virtually for the first time, a management support system that, because of its critical operational responsibilities, is supported by reliable, relevant and timely data. The architectural unification of a management support system (the human-engineered, nonprocedural-based front end) with a transaction processing system (the traditional back office) has, in the opinion of this writer, turned out to be the most significant architectural development of this entire effort.

In July 1974, five months after receiving the original charter, the OR group delivered and demonstrated to RCA's top management a fully operational, though obviously initial, version of the system's data base structure and front end. It used the real-world data of one of RCA's divisions, which had agreed to join the development as a cooperative venture.

This pilot showed clearly how and by whom such a system could be used and what type of issues it would be capable of addressing. It should be noted that none of the back-office capabilities existed at that time — this, by the way, usually accounting for at least 70% of the total design cost — proving again that back-office capabilities are taken for granted by managers and, therefore, are transparent to them.

The back office does not add one iota to the visibility of the system, except when it does not work.

Following a successful demonstration of the front-end pilot in mid-1974, the OR group was commissioned to construct and install the entire system. The initial back-office facility was designed and constructed by the end of 1974, and installation at the pilot operating unit began in 1975. It required almost five years to install this system at all 18 of RCA's operating units. Usually two or three units were in varying stages of implementation at one time. By 1979, the entire corporation was on the system.

The system's performance has been judged by the user community to be more than adequate; it has, in fact, had a major impact on the productivity of the function, this being the subject of the remainder of this article. Figure 2 summarizes system operations for the calendar year 1980. It is most gratifying that system economics continue to be favorable, despite several intervening price increases of computing facilities and vastly increased usage as the system's capabilities expand and broaden.

This section of the article, describing the Iris system as the vehicle of the productivity study, has as its only purpose the explanation of the dual role of the system. It is the means of formulating analysis on an ad hoc basis, in the manner of the laboratory supporting scientific analysis and new development. At the same time, it is also the means for managing, in the most comprehensive sense of that word, all of the relevant data needed to support such analysis and new development. This dual function under one system roof, so to speak, is a relatively new phenomenon and has already broken new ground in business systems architecture and style.

The remaining sections will relate the impact of this system on the productivity of the user function and, thereby, the cost-effectiveness of this system effort. It should be noted that the postimplementation audit measures, as shown in Figure 2, were programmed into the system and are produced for performance evaluation on a regular monthly basis.

Cost of Information

An important paper published in 1976 introduced, or at least systematized, a much broader outlook on the entire issue of business information and, especially, the costs associated with its care and feeding. In "Managing the Costs of Information" (*Harvard Business Review*, September-October 1976), Paul Strassman suggested that "managing information systems now goes far beyond just managing computers." Just how far beyond did not become clear until some operational measurements were taken in subsequent years. The results were, to say the least, startling and disquieting.

In order to begin to cope with the issue thus identified, Strassman proposed that information processing, in its broadest sense, be viewed as

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encompassing three sectors:

1. *Traditional DP/MIS,* the well-defined and clearly identified activity relating to the use of computers and computer services.

2. *Administrative processing,* the large and growing "set of tools and facilities for handling information transaction." These include communications facilities, word processing, reprographics, micrographics, facsimile devices and a host of others dedicated to handling information in one way or another.

Strassman pointed out correctly that "this sector is rarely aggregated under a single expense heading, yet it accounts for the largest and most frequently used set of tools and facilities for handling information transactions." This dispersion obviously makes measurement of its size a more difficult matter than in the case of the first sector.

3. *The office,* "the most labor-intensive institution in American life," as it has been called, accounts for the single largest occupational category in the U.S. labor force — approximately 25% of the total. To quote Strassman one more time:

"After all, neither data processing nor administrative processing is an end in itself. The payoff from all sorts of office devices and facilities, from computers to mail rooms, lies in increasing the productivity of office labor — secretaries and typists, switchboard operators and clerks, administrative personnel and people who process applications, claims, orders and inquiries of all sorts — that host of office employees classified as nonmanagerial and nonprofessional."

This third sector is neither aggregated under a single expense heading nor even normally associated with the tasks of information management. This makes the measurement of its nature and size an extremely difficult task. Since the third sector is composed entirely of people, a capable human resources management (HRM) system is an absolutely vital prerequisite for such measurements in all large, complex and diverse organizations.

It is important to note that this classification scheme specifically excludes managerial and professional personnel, which obviously represent a large cost element. This point is particularly critical to making the correct interpretation of the productivity results presented later on in this article.

The numerical results presented in the Strassman paper are summarized in Figure 3 on In Depth/3. The three sectors were estimated in 1973 to have accounted for a national expenditure of $26 billion, $42 billion and $350 billion, respectively. Recent estimates for the 1979 economy put the totals at more than double those numbers. However, it is not the absolute figures that seem important here, but rather the sizes of these sectors relative to one another.

It came as a shock to even the best informed experts in the field that 84% of the cost of managing information is tied up in labor content. Conversely, it is startling to realize that traditional DP ac-

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counts for only 6%.

This result is doubly disconcerting when one realizes that actual computer hardware, which is estimated today to account for 30% to 40% of total DP cost, according to this breakdown represents only 2 cents to 3 cents of the total information cost dollar.

Was there ever a more telling signal that it may be time to adjust our priorities and broaden our horizons?

When these results began to be digested at RCA, three large questions immediately emerged:

1. What do these numbers look like for RCA?

2. Are there reliable ways of measuring the size of the third sector, and how might this be accomplished?

3. If the results of such measurements indicate a relationship even approximating that in the national picture, what can systems technology do to help alleviate the problem at RCA?

Consequently, an effort began in early 1977 to address this vital issue by first tackling the measurement problem.

The top two sectors of the information cost iceberg are relatively easy to measure. In the first place, they are closely and explicitly associated with information handling, especially the first of these, and the accounting system is, therefore, usually helpful in identifying, collecting and summarizing these costs. In addition, most, if not all, large companies require some form of staff approval of device acquisitions in these areas, thus facilitating reasonably accurate estimates of the sizes of each of these cost components.

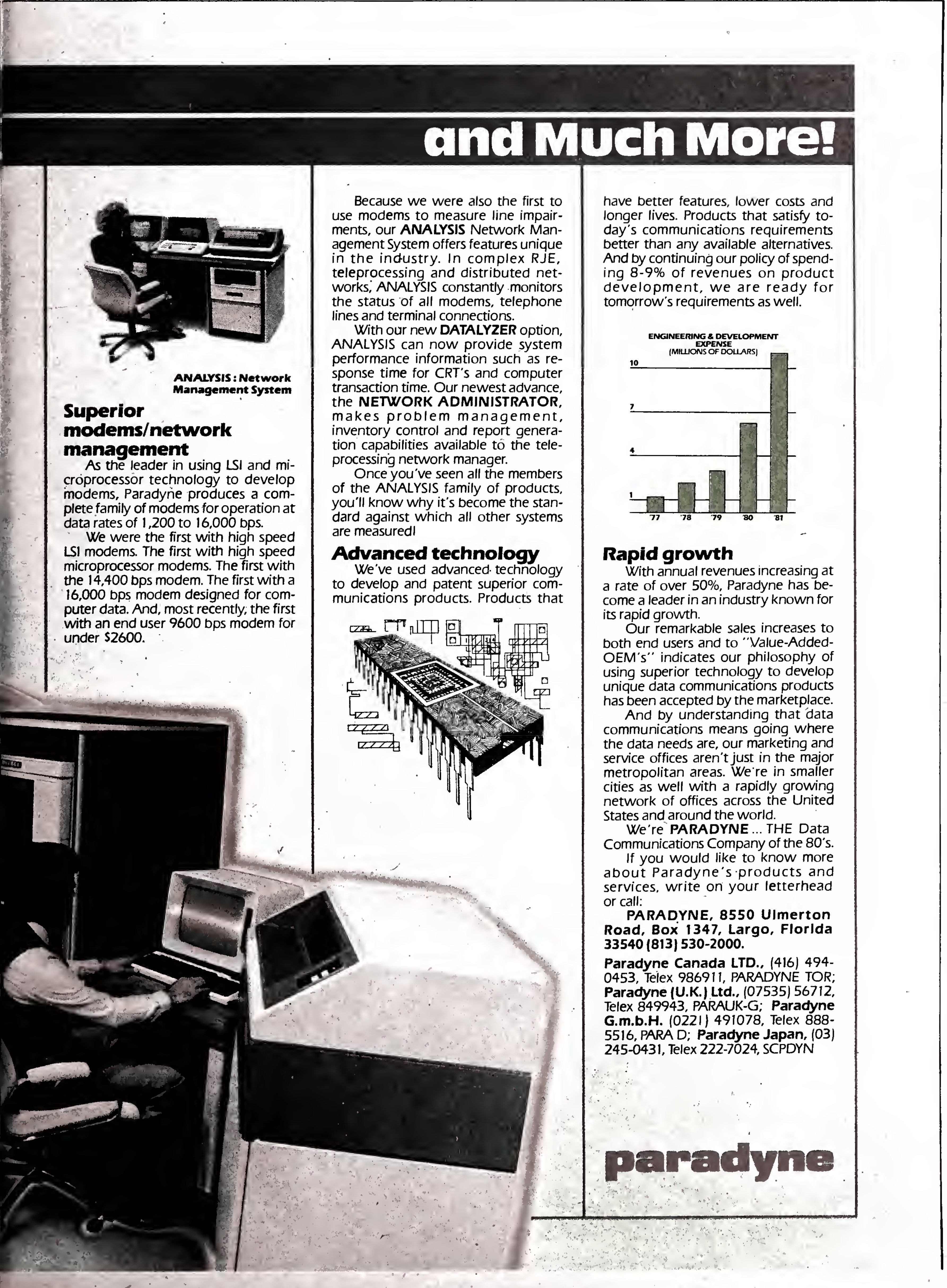
Difficult Measuring Task

The third segment, however, is normally very difficult to get reliable readings on. The fact that this piece accounts for the bulk of the problem complicates the matter and makes it all the more urgent. The reason for the measurement difficulty is the pervasiveness of white-collar labor in every aspect of business activity. The accounting system is of no help at all in identifying and collecting these cost elements, which are functionally, organizationally and geographically dispersed throughout the entire enterprise.

To begin addressing this measurement task, an organization needs what could be called a "human resources accounting system" — in short, an information system about people with at least the minimum of occupation coding to allow classification by job category relevant to the task at hand, in this case white-collar labor involvement in handling business information.

Fortunately, RCA's Iris system not only contained such occupation coding satisfying the minimum requirements, but also provided a companywide utility for experimentally developing a model that would lead to a consistent definition of the "information worker." Such a definition was needed to assess the size of the labor content segment of the information cost iceberg.

This definition eventually



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boiled down to three labor cost elements for a specific subset of the employee population: base pay, the employee benefit package and a modest overhead factor. The last two items are computed as percent of base pay.

The information worker subset was defined to consist of all indirect, salaried, nonsupervisory employees holding "nonpolicymaking" jobs. The last qualification, particularly, required a good deal of custom tailoring to some operating units because of their unique activities. This general definition was tested extensively and appears to serve the purpose adequately and consistently.

It should be noted that this definition is, if anything, exceedingly conservative, since it excludes overtime, temporary help, direct labor and all forms of supervision. This was the intent, because the problem as gleaned from the national statistics was so large that it was judged critical to avoid any form of overstatement. Therefore, any errors or approximations were to be on the side of omission, and when there was any debate or reasonable doubt as to whether or not a certain job category was to be included among the information worker class, it was left out.

'Knowledge Worker'

The term "knowledge worker" is also beginning to be used in the literature. This means something quite different; in fact, it can be thought of as the flipside of the information worker, in the sense that the combined populations of knowledge workers and information workers make up the totality of the white-collar labor force. The RCA definition of the knowledge worker includes all supervisory personnel plus all those others who hold policymaking positions.

In other terms, the knowledge workers are the principals, supported by the information worker staffs in the various functions. The former are specifically excluded from the measurements reported here.

The resulting breakdown of the cost of managing business information at RCA, as measured on the basis of actual 1978 operations, is shown in Figure 4 on In Depth/3. While it is true that RCA's ratios are slightly less lopsided than the national picture, showing a 72% labor content rather than the 84% reported by Strassman, the overall relationships are not too dissimilar.

These figures provided the first hard evidence that white-collar intensity and productivity were indeed large and important issues that were identifiable, measurable and, therefore, selectively tractable. They raised the all-important question with RCA's information function, whether and to what extent computer-based systems could replace some of these labor costs and, thereby, help to improve the productivity of the white-collar labor force.

It was most fortuitous that the Iris system was, at that time, in the middle stages of companywide implementation. This circumstance endowed the system with a dual role; not only did the system serve as the means of taking the measurements, but it also provided the basis for the test of the system's capability to impact the productivity of its user community. This test is described in the next section of this article.

The Experiment

In 1978 it became apparent that RCA's Iris situation had become the basis for a large "controlled experiment." This could be used to test the question of whether a system of this architecture can, in fact, improve the white-collar productivity of its user community. The basic purpose of Iris, as was stressed earlier, had always been the support of RCA's managerial processes. Cost reduction at the clerical level had never been an issue and was, at no time, even mentioned as a system objective.

Fourteen of RCA's 18 operating units participated in this experiment. The remaining four units were ineligible because they did not, at that time, support RCA's standard occupation code structure and, therefore, could not contribute to the required productivity measurements. The 14 participating companies were divided into a target and a control group.

The target group consisted of nine companies comprising 42,000 employees. It contained three high-technology companies, three high-volume manufacturing companies and three service companies. This statistical balance is important because these three different types of business have very different human resource management requirements.

The Iris implementation schedule for these nine units was as follows. The first or pilot unit had become fully operational by May 1975 and the last of the nine by June 1977. It takes three to six months for the full impact of the system to be felt, with later implementations drifting more toward the three months end of this range.

Therefore, it can be hypothesized that these nine units, in the aggregate, will reflect during the 1976-78 period whatever impact Iris has had on their operations. It could be expected that the implementation sequence of two units in mid-1975, two units in the first mid-1975, two units in the first half of 1976 and five units during the first half of 1977 would result in growing aggregate impact during these three years.

Control Group

The control group consisted of five operating companies comprising 21,000 employees. It contained two each of high-technology, high-volume manufacturing and service business. (One large unit is, in effect, two separate businesses: one high-technology and one service. Hence, the differential in count.) Both groups were statistically balanced to assure with high probability that they were originally, in the pre-Iris period, part of the same population.

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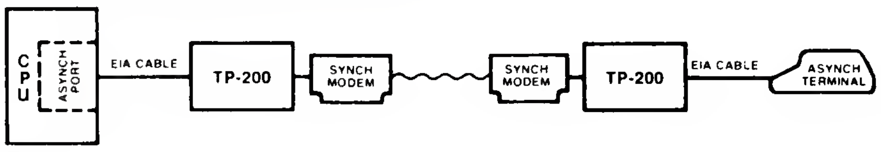

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The earliest Iris implementation in the control group took place in November 1978 and the latest in early 1979. Thus, no impact of Iris could possibly be felt during the 1976-78 period.

This situation appeared to satisfy the requirements for a large-scale, controlled experiment in a rapidly changing environment. Since it takes at least three months for the impact of an Iris implementation to be felt and since the human resources area is very dynamic, it was clear that the typical "before-and-after" experimental setting would be unreliable and possibly even misleading. Too many other factors change during those three months to identify and isolate the effect of a single change.

But the "with-and-without" basis should be reliable, provided that both groups are indeed from the same population, start the experiment under the same conditions and experience the same information demands and general circumstances for the duration of the experiment. All three conditions were met in this case.

Well-Timed Project

It must be pointed out that the 1976-78 experimental period, which was clearly not a matter of choice, represented an extremely fortuitous circumstance. During that time, governmental demands for information about people grew dramatically. Never before had personnel departments in large companies been subjected to such pressures.

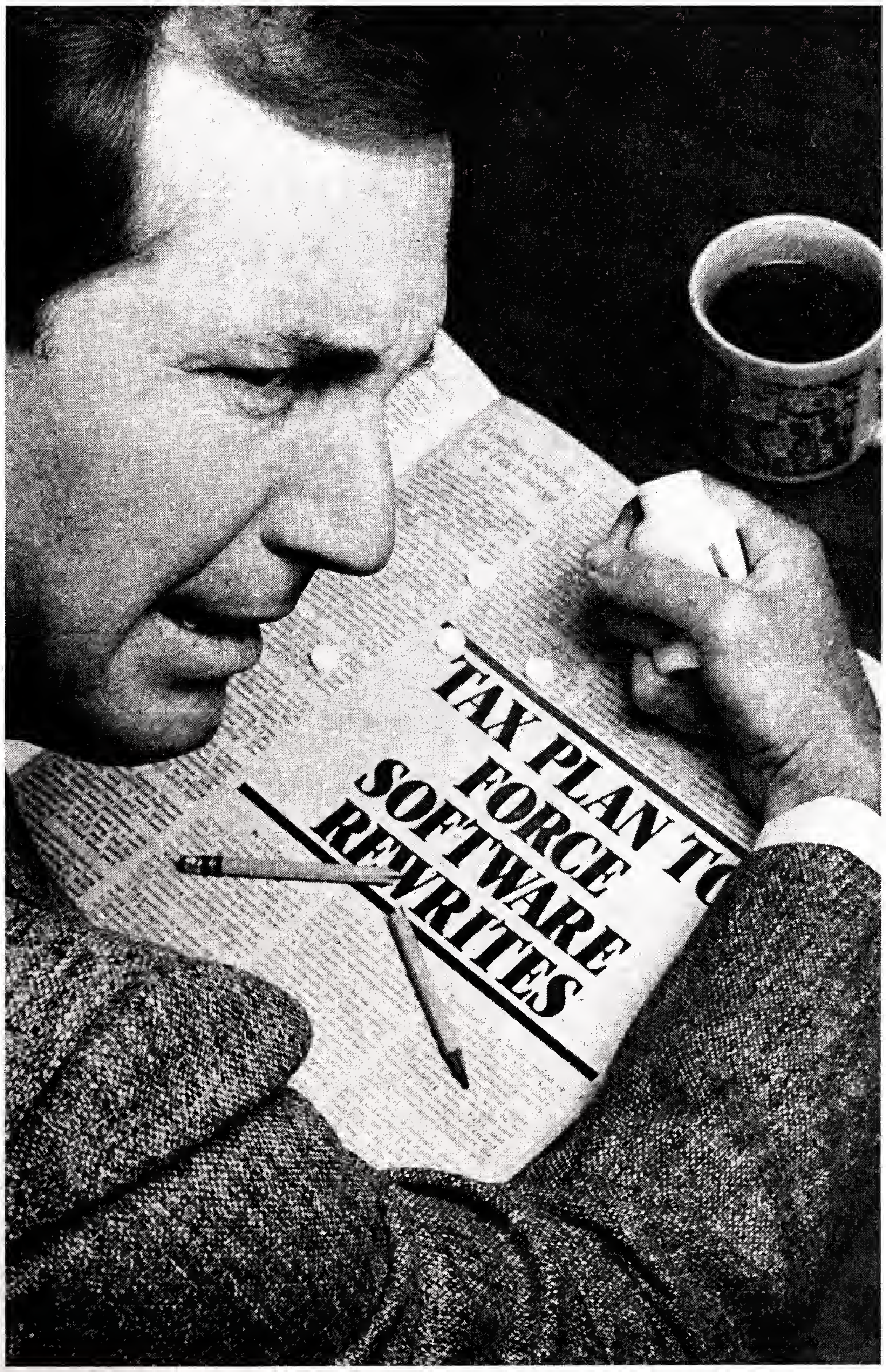
In addition, the long pent-up demand for internal change at RCA caused massive internal programs to be initiated and executed during that period. These unprecedented levels of activities clearly illuminated the existence of a responsive facility for supporting human resources management functions, far more so than could have been expected during relatively tranquil times.

One more significant issue needed to be resolved prior to taking the measurements. This was the establishment of the "productivity measure" of the user activities, namely the personnel departments. This is not an easy matter and care was taken not to overcomplicate this issue for the sake of satisfying the special interests of some of the operating units.

The final solution was rather simple and served the present purpose as an adequate first approximation. It was agreed to use the "cost of information," using the definition of "information worker" developed earlier, and to calculate that on the basis of annual cost per employee serviced by the department. This cost of information per employee per year was then tracked for the three years for which the experiment can deliver statistically valid results.

The Results

The "information worker" definition was now applied with one additional qualification: that it identify only those individuals who were engaged in personnel work. The Iris system was thus enabled to identify and calculate the annual "cost of per-



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sonnel information" and to normalize this over the total number of employees serviced by each personnel function. This cost of personnel information per employee per year is plotted in Figure 5 as the vertical axis against time. The two graphs describe the behavior of the target group (A) and the control group (B).

By the end of 1976, with only four of the nine group A companies fully operational on Iris and all other factors remaining the same for groups A and B, group A achieved a per capita white-collar labor cost level more than 15% below that of group B.

It must be understood that this is not a cost reduction in the traditional sense, since no clerks or administrators were separated as a result of the system's installation. Rather this difference represents the cost of the labor force that the group A companies did not have to hire in order to satisfy the large and rapidly growing requirements for people information. Thus, the term "cost avoidance" is more descriptive of the financial impact.

By the end of 1977, the cost avoidance differential had risen to 30%, or about twice the 1976 level. This might have been anticipated since now all nine group A companies had been fully implemented.

The level portion of the B curve resulted from tight head-count and cost controls instituted in 1978 to cope with the head-count growth experienced by the group B companies. Those companies were attempting, through traditional means, to keep pace with an ever-growing volume of information requirements. As a result, the increasing demand for personnel information was now met in group B, whenever necessary, through overtime and temporary help rather than additions to force. Since neither overtime nor temporaries are accounted for as cost components in this measurement, this factor does not show up, making the comparison even more conservative.

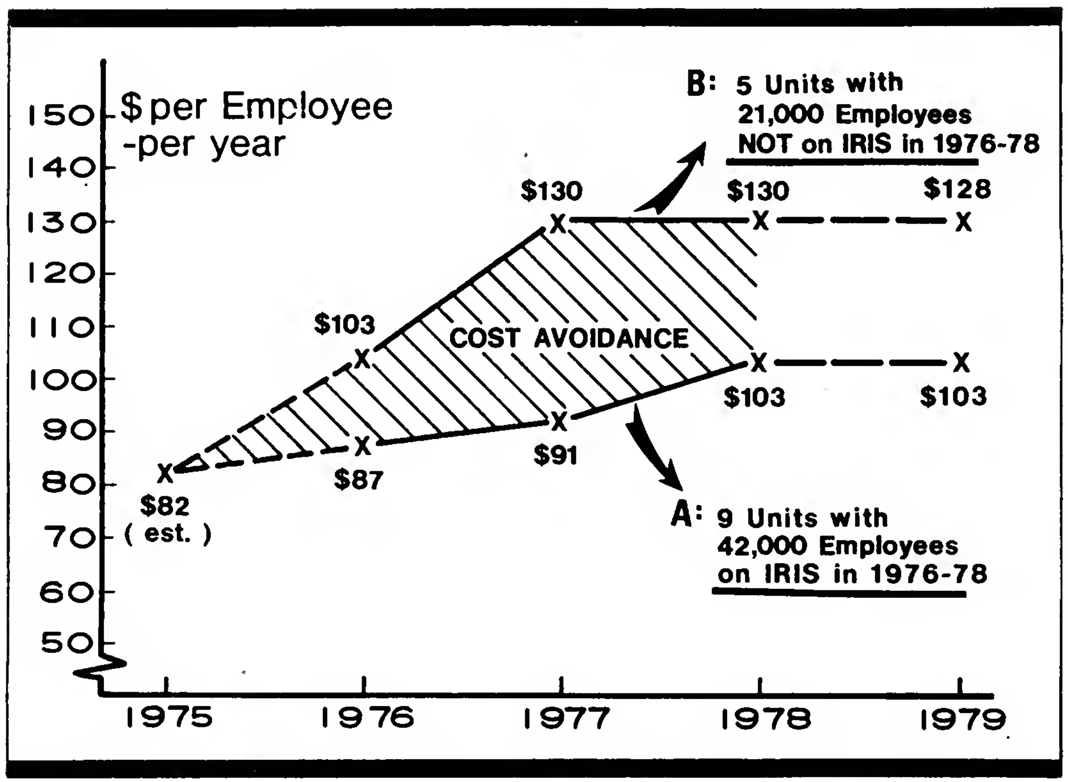

Figure 5. Cost of IR Information

The slight rise of the A curve from 1977 to 1978 is quite interesting and has a very subtle explanation. Prior to Iris, computer system costs incurred by personnel departments had always been a part of the unit's MIS budget. Personnel managers had never been acquainted with the costs associated with managing information about people. When Iris was being developed, it was decided to make each personnel department — in fact, each individual user — aware of and responsible for the costs incurred.

It was also quite clear that if personnel managers were to exercise effective cost controls, then the performance units, which are billed by the system to the user, must be in terms to which the user can relate. It became inappropriate, therefore, to bill for CPUs and input/output units and all the other "computerese" terms, as is the case with traditional billing systems.

Instead, the Iris system was designed to contain a mapping system that could translate traditional computer charges into work elements meaningful to the user, such as transaction processing, standard report production, ad hoc report development and many others.

The confrontation with system costs came as a shock to many personnel managers, almost regardless of the amounts involved. No budget for this item had been established for 1977 in the personnel departments, since most managers anticipated and hoped that MIS would continue to fund this effort. As a result, budget overruns occurred in a number of personnel groups. Consequently, some of the positions that were vacated through normal attrition — retirements, transfers and so on — were left temporarily unfilled.

When the Iris system's high level of performance convinced the managerial community that the system was here to stay, its costs were carefully budgeted for 1978. It then became possible to fill the temporary vacancies to bring the activities back to full strength.

By the end of 1978, the cost avoidance of Iris had leveled off at a little more than 20%, amounting to approximately $27 per active employee per year. This represented a current annual rate of about $2.5 million companywide.

The year 1979 is not one of the test years, since all but one of the group B companies were fully implemented by early 1979. It is interesting to note, however, that the B curve is beginning to turn around, as would be expected or certainly hoped, and that the A curve continues to hold its own quite satisfactorily.

Profitable Venture

This $2.5 million annual cost avoidance represents a change in labor content and does not reflect the system cost incurred to accomplish this. This relationship is shown in Figure 6. The left-hand bars show the cost-avoidance level in each of the three years. The right-hand bars show the system cost that replaced the labor cost. In 1978, $7.15 per employee per year spent on the operation of Iris (plus approximately $4 for Iris support staff) replaced $27 per employee per year of labor cost. This amounts to a 60% return and is a profitable venture by any standard.

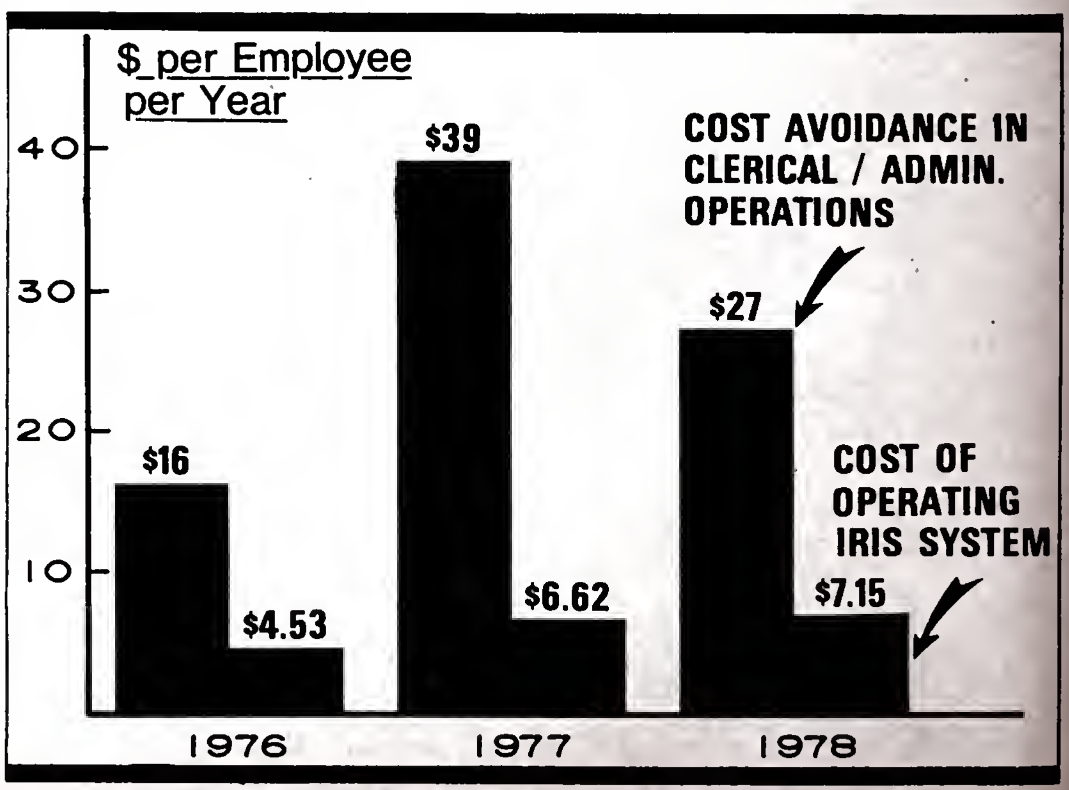

Figure 6. Iris System Cost/Performance

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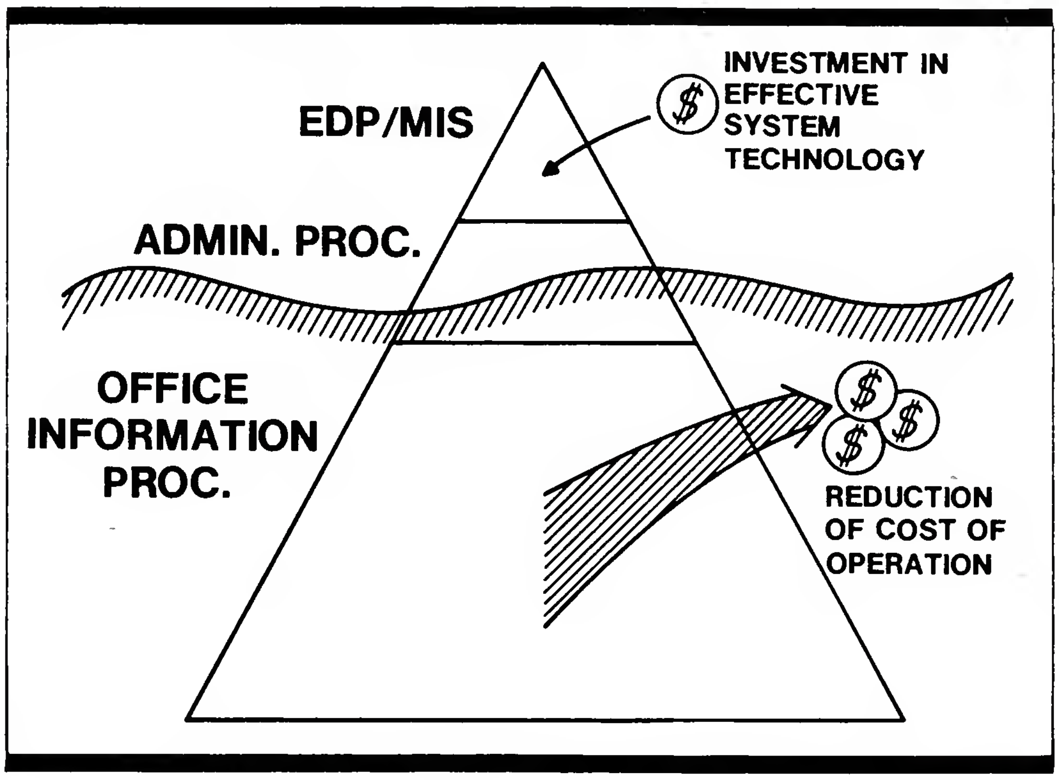
This payback does not include the favorable impact the system clearly has on the managerial processes. Even though we do not know how to measure that in dollars and cents, the record shows that in 1980, $3.42 out of a total of $7.45, or 46%, was spent on managerial usage. Since this requires personal time, effort and money on the part of the managers who use this facility, all three of these being precious commodities in any managerial community, it must be inferred that the system performs its top-priority mission adequately, if not with distinction. Since the ad hoc percentage is still growing after several years, the "novelty effect" can no longer explain this extraordinarily high level of managerial acceptance and participation.

To return to the information iceberg concept, Figure 7 depicts an overview of this productivity improvement experience and trade-off. It claims that each dollar invested at the top of the pyramid in effective system technology can be expected to replace at least $3 in white-collar labor cost. The key word in that claim is "effective."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OFFICE INFORMATION PROC.
$
INVESTMENT IN EFFECTIVE SYSTEM TECHNOLOGY
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$
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REDUCTION OF COST OF OPERATION

Figure 7. How large is the system ROI?

Wider Application

It is quite clear that the systems concepts of this particular case are by no means restricted to personnel operations. On the contrary, every business function, especially finance, can benefit equally from this type of system architecture. It has, in fact, been reliably estimated that the relative cost-avoidance potential in financial operations is, if anything, even greater than that in personnel functions.

It is not at all inconceivable that the companywide end result of an effective office information program can be a displacement of 15% to 20% of the cost of office operations. Since the total cost of information in most companies amounts to about 10% of gross revenues, when white-collar labor content is included, the impact for a corporation with $8 billion in sales, for example, would be a pretax profit improvement of $120 million to $160 million, no small potatoes in any man's book.

Interpretation, Lessons

The operating results reported in the previous section present a startling development from at least one point of view. Here was Iris, a decision support system commissioned to provide information support of RCA's personnel policymakers and managers at all levels of the enterprise from plant location to the corporate executive offices. Never once in the course of the system's existence, from initial conception through development to installation throughout the firm, did the issue of clerical cost saving arise as a system objective, even a low-priority one.

The primary objective of effective managerial support was paramount and has clearly been accomplished. The secondary objective of an effective back office was there to assure achievement of the primary mission and, while it was certainly anticipated that the cost of this back office would be affordable, cost reduction or avoidance was not a consideration.

'Conventional DP wisdom had had it for many, many years that cost displacement systems (intended only to produce clerical savings) and decision support systems (intended only to improve the firm's managerial processes) are entirely different worlds and cannot successfully cohabit a single, integrated system architecture. It is now becoming quite clear that this is a faulty hypothesis.'

Now it turns out, after several years of use, that reliable, hard measurements of actual operations indicate a major cost impact on the support staffs in the user organizations — a totally unexpected result. It must be asked, therefore, what it is about this particular system that might account for this phenomenon.

As was enumerated earlier in this article, four major design decisions were made at the outset. These related to use of:

- Data base technology.
- An interactive, nonprocedural front end.
- A conventional, batch-oriented back office.
- A directly transaction-driven decision support system.

There is nothing new about a decision support system having the first three of these, taken one or even two at a time. But the concept of a directly transaction-driven decision support system combining all four of these attributes appears to set this system apart.

Thus, the fourth design decision would have to be judged, in retrospect, to have been the most far-reaching in generating not only a new system architecture, but also a new and very different "system personality." The system presents radically different views of itself, depending on who is doing the viewing. To the local manager the system looks like a local system, while to the senior corporate executive it looks like a top-level, companywide system. Clerical staffs see the system, with equal user friendliness, as a clerical support facility for managing day-to-day matters of data handling, while managerial users see only the portion that supports them.

All this is contained in a single, though compound, architecture, and this point leads to the major lesson to be learned and capitalized upon.

Successful Integration

Conventional DP wisdom had had it for many, many years that cost displacement systems (intended only to produce clerical savings) and decision support systems (intended only to improve the firm's managerial processes) are entirely different worlds and cannot successfully cohabit a single, integrated system architecture. It is now becoming quite clear that this is a faulty hypothesis.

Not only can those two types of systems cohabit a single, integrated architecture most harmoniously, but the synergy achieved thereby makes this combination very much greater than the sum of its parts. The cost-avoidance potential at the clerical support level of this type of system architecture appears to be considerably larger than that of traditional systems specifically designed for that purpose (see Figure 8).

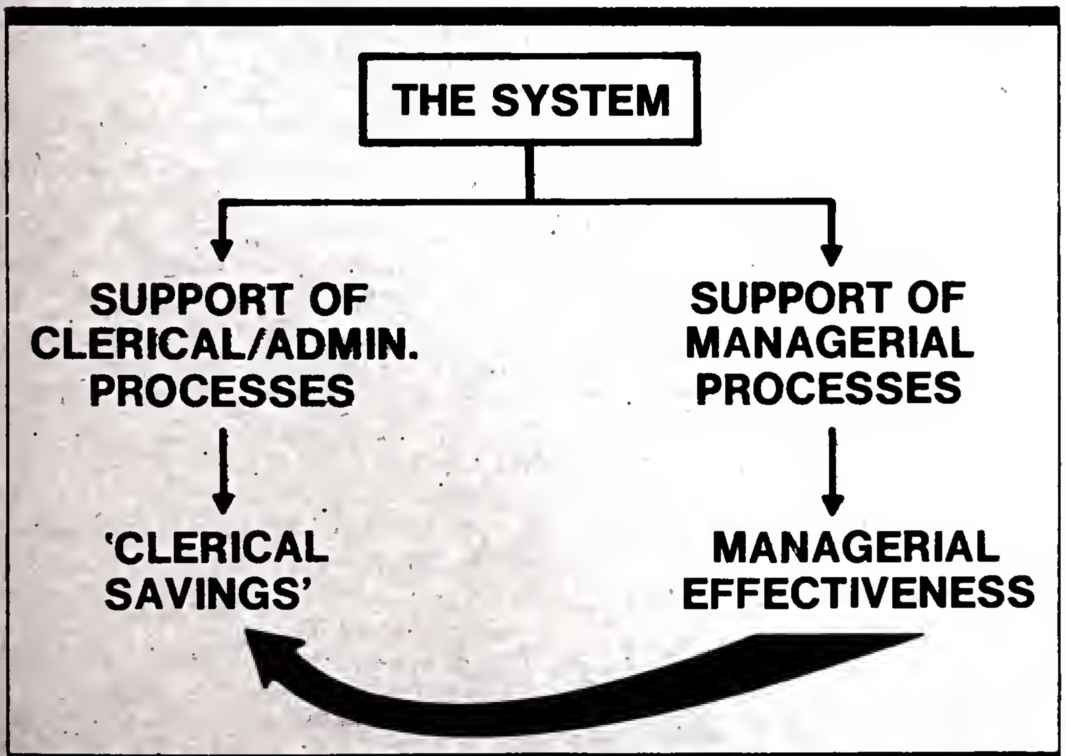

THE SYSTEM
SUPPORT OF CLERICAL/ADMIN. PROCESSES
SUPPORT OF MANAGERIAL PROCESSES
'CLERICAL SAVINGS'
MANAGERIAL EFFECTIVENESS

Figure 8. System Impact

Perhaps it should not be too surprising, again in retrospect, that the best road to more efficient office operations is through more effective support of the managers. One need only visualize the often frantic activity that can begin at the clerical support level when a manager, especially a senior executive, raises an often quite innocuous question. It is easy to see and has now been reliably demonstrated that a higher degree of managerial self-sufficiency with respect to relevant business information not only avoids much of the clerical churning, but also produces better and more timely information.

In Conclusion

The Iris system is now sufficiently institutionalized at RCA to have become an absolutely indispensable tool of the industrial relations communities throughout the firm. It is expected that its architecture will become the standard in systems for other business functions, especially finance, and in other companies. The economic benefits accruing from major reductions in cost and time of development cycles will be one of the incentives as will equally major reductions in the cost of maintaining such a system. But the most powerful incentive will continue to be genuinely effective support of the firm's managerial and professional activities.

The decision support system concept, able to call on ad hoc aggregates of real-world data and available on an on-line basis, has resulted in perceived levels of managerial utility never before reached. (It is, of course, understood that there are applications where, because of high transaction volumes, such direct interaction is economically inadvisable. In those cases, however, the direct on-line extract will deliver the same capability without impairing the system's architectural integrity in any major way.)

The availability of even a modest facility for ad hoc modeling has added greatly to the managerial perception of high system utility, since it is no longer necessary to have professionals program relatively trivial tasks. Of course, extensive and complex modeling will require, for the time being, professional effort.

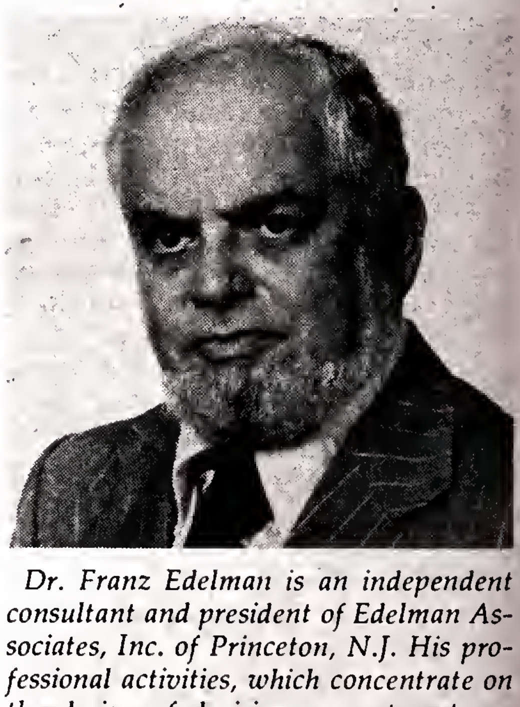
This facility has produced a major reorientation toward the notion of system efficiency. Whereas this used to be perceived as relating primarily to how efficiently the hardware was utilized, that is, by the "throughput" of the computer installation, it is now seen much more appropriately as relating to the productivity of people — both systems professionals and, more important, end users. Since people now comprise 70% to 80% of the total cost of managing information, this reorientation is surely long overdue.

It is said, and rightly so, that one measure of a system's effectiveness is the degree of its organizational impact. While this is perhaps an issue requiring longer lead times, there have been organizational changes in the direction of emphasizing the IR function's information resources and giving it more prominent organizational placement.

One major organizational change has resulted directly from this development. The corporate operation research group, which was originally commissioned to design, build, install and run this system, was assigned the responsibility for all corporate system development in 1976 and for all aspects of computer applications in 1977.

All this has resulted in a change in outlook, on the part of the managerial community of the user function, toward computers, computer people and information management in general. It has surely raised the credibility level of the information function and has begun to yield more acceptable returns from the considerable investments in the resources of information management.

About the Author



Dr. Franz Edelman is an independent consultant and president of Edelman Associates, Inc. of Princeton, N.J. His professional activities, which concentrate on the design of decision support systems, are conducted through Index Systems, Inc., a management consulting and systems development firm based in Cambridge, Mass.

Formerly corporate staff vice-president for business systems and analysis at RCA, from which he retired to form his own business after a 30-year career, Edelman designed and originated the Iris system for managing information in the human resources area.

A widely known lecturer and writer on information systems, he holds M.S. and Ph.D. degrees in applied mathematics from Brown University.

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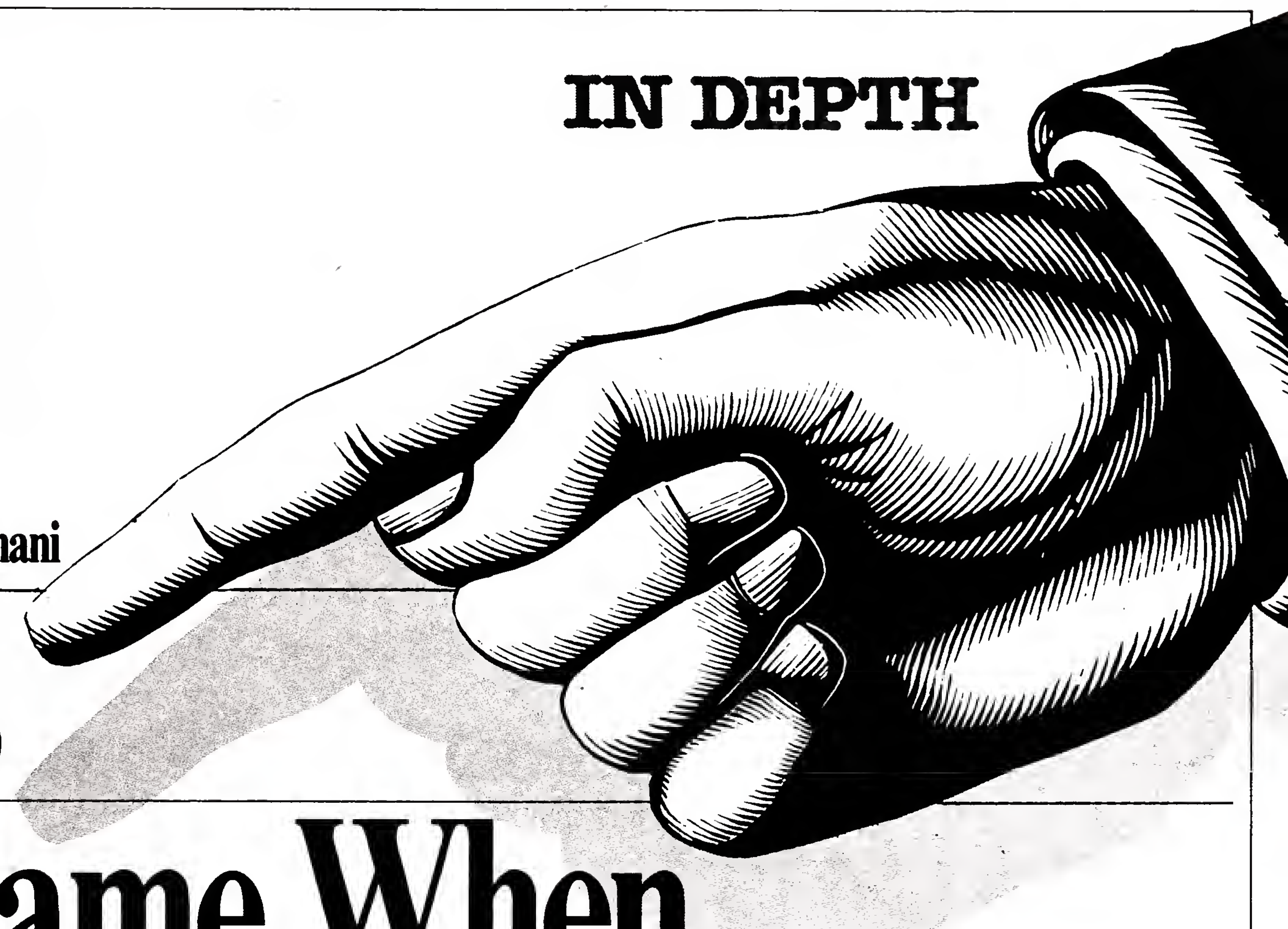

By Michael C. Gemignani

Who's To Blame When The Program Fails?

Theories in Programmer Liability — Part 4

In the first three parts of this series, we examined various theories under which suit might be brought against a programmer should some damage flow from a "malfunction" in a program. The malfunction need not necessarily be an error, but might be a lack of appropriate security or the publication of defamatory information.

Of course, it is important to try to avoid being sued in the first place. Unfortunately, often even when a defendant wins a suit, he still pays a heavy price emotionally and in attorney's fees. Only in the rarest instances can attorney's fees be recovered by the defendant.

But if one is sued, it is obviously better to win than lose. Moreover, in some instances, there may be the possibility of counterclaims, or claims the defendant can make of the plaintiff. For example, if a defendant is brought into court for an alleged breach of contract, the defendant himself may feel that he has a breach of contract action against the plaintiff and counterclaim, thus, in effect, also making the plaintiff a defendant.

In addition to asserting possible counterclaims, the defendant will want to raise defenses. One defense is to deny some assertion critical to the plaintiff's case. Another form of defense is essentially a statement to the effect, "Yes, what the plaintiff says happened really did happen, but I cannot be held liable for the damages involved because . . ." What follows the "because" is the defense. Following is a discussion of some of the possible defenses to the various legal actions discussed thus far.

Some defenses are easily understood. The plaintiff states there has been a breach of contract. The defendant claims no contract existed. This is simply a difference of opinion concerning an important fact, a dispute the court must resolve. The defendant might even be more specific than merely claiming there was no contract; he might state that the parties never agreed as to price, or that the plaintiff did not accept his offer until he had already withdrawn it.

By making such assertions, the defendant is stating that a crucial element in the plaintiff's case is missing; there can be no breach of contract if there was no contract. There can be no contract if there was no meeting of the minds.

If the defendant relies solely on defenses such as these, then if the court finds that there was indeed a contract, he has lost the case. Once the contract is found to have existed, the breach will be found and the defendant will be liable. Therefore, the defendant will want to be able to say something like, "Even if a contract is found, I am not in breach of the contract because I have fulfilled my part of the bargain," or, "Despite the contract, I am not obligated to perform my part of the bargain because the plaintiff has not performed his."

A contract itself may provide defenses. One important defense is the Statute of Limitations. The contract may have a limitation-of-remedies clause stating that any action for breach of contract must be brought within one year after the delivery of the program. If the suit is not brought until one year and one day after delivery, the programmer can then admit every nasty thing the plaintiff has to say about him under a breach of contract theory, but he can point to the limitation in the contract and declare that the plaintiff no longer can bring the suit at all. He is one day too late.

A breach of warranty action can be defended by pointing to a disclaimer-of-warranty clause. The defendant may also claim that the contract specifies the maximum damages for which he can be held liable under a contract theory is $500, hence he cannot be made to pay the $500,000 the plaintiff seeks.

Negligence Action

But the plaintiff may seek to avoid the limitations of the contract by proposing an alternative theory of recovery, usually in tort. For example, the plaintiff may fully admit a contract exists, that certain work was done under the contract and that more than the one year the contract permits has passed without his bringing suit against the programmer for damage caused by defects in the program. However, the plaintiff states that the programmer was negligent in doing his work. The suit is brought in negligence, which is a theory outside the contract, a tort theory, and the statutes of the jurisdiction on which the suit is brought may allow several years to bring a negligence action.

What are some defenses to a negligence action? First, of course, the defendant may argue that some key element necessary for recovery in negligence is missing. If there was a contract between a programmer and the plaintiff for delivery of the program that led to the litigation, there would almost certainly be a duty of care owed the plaintiff. However, if

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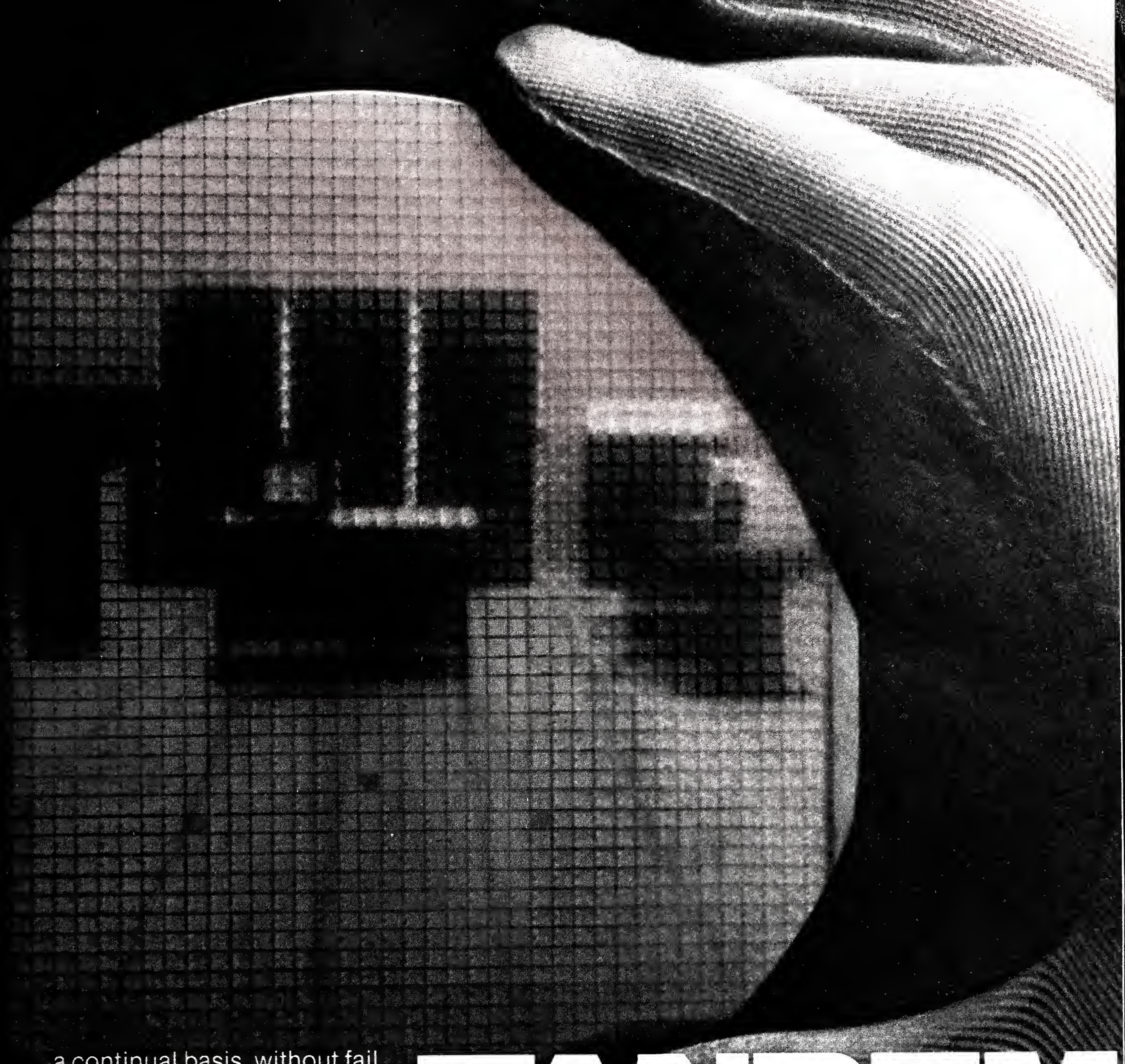

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the plaintiff is someone further removed from the contract — for example, a customer of the programmer's client — the programmer-defendant could argue that he owed no duty of care to that plaintiff in the first place.

He could further argue that even if a duty of care existed, due care was used; hence there was no breach of the duty of care. Inasmuch as there are no uniform standards throughout the computing industry, it would be hard to refute that a moderately conscientious job was careful enough.

Or the defendant could argue that even if there was negligence — a duty of care and a breach thereof — the requisite causation was missing. Either the damage at issue was not caused by the malfunctioning program or it was too far removed for the court to consider it. He could also challenge the plaintiff's alleged damages as being false or grossly inflated. The plaintiff must prove actual damages and not merely leave them to the imagination or speculation.

'Affirmative Defenses'

What, though, of the instance where there has indeed been true negligence and real damage, and the defendant knows this is the case? There are still defenses that can be raised that admit the negligence, but attempt to bar any recovery by the plaintiff. The two most common such "affirmative defenses" are contributory negligence and assumption of the risk.

Contributory negligence occurs when the plaintiff himself was negligent and that negligence contributed to his injury, that is, his negligence was also a cause of the harm he suffered. If A is speeding, B runs a stop sign and A and B have an accident, then it is quite possible that neither will be able to recover from the other for injuries suffered if the speeding and the running of the stop sign were both causes of the accident.

In the case of an errant computer program, the defendant may claim the plaintiff was negligent in failing to instruct himself in the proper use of the program or a computer, or failed to obtain qualified personnel to ensure that the program was workable in the context in which it was being used, or the plaintiff negligently failed to provide the defendant with critical information needed for the success of the program.

In using contributory negligence as a defense, the defendant will have to prove the elements of negligence with regard to the plaintiff as they relate to the injuries in question. The duty of care is not that owed the defendant (because the defendant is claiming that the plaintiff injured himself), and anyone may be assumed to have a duty of care to himself to avoid needless injury. There may be a real issue whether the plaintiff breached that duty of care by foolishly buying equipment that he should have known was inadequate to a given task or by failing to educate himself as to the matters with which he had to deal.

Likewise, causation might be an issue. Even if the defendant's negligence was a cause-in-fact of the injury, was the plaintiff's conduct also a substantial factor in that injury? And even if the plaintiff would have suffered some injury anyway, the question can be posed whether his subsequent conduct aggravated the injury.

Generally, injured parties have an obligation to mitigate damages, that is, to act in such a manner as to reasonably keep their injuries or losses to a minimum. Someone who has had a leg broken in an auto accident cannot then refuse reasonable treatment and expect the one who caused the accident to pay for any aggravation to the injury that might have resulted from the unreasonable refusal of medical attention. Likewise, someone who detects that problems with a computer program are causing losses in his business may well be found to have an obligation to find an alternative system to keep books or control inventory until the problems with the program are corrected.

Similarly, if an alternate source could have been found after it became clear that the defendant programmer could not do the work properly, the plaintiff would probably not be able to collect for damages suffered because of the failure to take

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remedial action. He could recover for the damages suffered, though, until such time as appropriate remedial action should have been taken.

Assumption of Risk

The defense of assumption of the risk states that the plaintiff was aware of the risks inherent in the situation but chose to go ahead anyway. He knew that the program was complex and had a finite chance of error, but he chose to use it despite this knowledge. Therefore, he should not be permitted to come into court now and seek damages from the defendant.

This may be a very relevant defense in computer-related cases because computer systems are known to have the possibility of failing, and it can be proved that there is no universal method for determining whether a program is correct. In order to be able to invoke this defense later on, persons supplying computer services should make their customers aware that a computer is neither omniscient nor omnipotent, and the saying, "To err is human, but it takes a computer to really screw things up," must be taken with more than a smile. It could even be argued that the multitude of disclaimers in a contract are adequate notice that the purchaser of computer services uses such services at his own risk.

Some legal scholars maintain that assumption of risk is but a form of contributory negligence; one is negligent by assuming the risk. An increasing number of states are also applying the notion of comparative negligence. In jurisdictions where contributory negligence is an absolute defense to negligence, even the smallest amount of negligence on the part of the defendant might defeat an otherwise meritorious claim.

To try to get around seeming inequities, some states have said that if one party is, say, 90% at fault, then he ought to be made to pay for 90% of the damages and not simply be excused altogether because of the 10% fault of the plaintiff. Some comparative negligence recovery formulas are more complex than that of this example, but the general concept is catching on throughout the U.S.

Strict Liability

If a programmer is sued on a theory of strict liability, there is an excellent chance the court will reject the theory entirely. Most courts still consider programming to be a service rather than the manufacture of a product. Few, if any, programs can be considered "unreasonably dangerous" in the sense that that term has been applied in strict liability.

Finally, the vast majority of courts will only apply strict liability in situations involving personal injuries, not merely economic loss. If a theory of strict liability is accepted, however, then due care in preparation of the program is not a defense, nor is contributory negligence since the suit is not brought on a negligence theory.

However, there are still defenses even in strict liability. One such defense is assumption of the risk, or obvious danger. If the risks in the use of the product are sufficiently obvious, then the plaintiff will be held to have freely taken those risks and the defendant will not be liable. If a product is misused — for example, a power mower is used to cut a hedge — then the misuse can be interposed as a defense.

Substantial modification of the product can also be a defense. This might be particularly relevant in computer cases, since many programs are modified by the user to fit particular circumstances.

Likewise, there is also a "state-of-the-art" defense in products liability, which might prove valuable to programmer defendants. If a product is as safe as the current state of the art can make it, this can be a defense to an action in strict liability. Therefore, if a programmer has used whatever methods and equipment currently exist to try to ensure the reliability of a program, the state-of-the-art defense might well be effective. In essence, this defense is something of a "super due care" defense in that it states that not only has the programmer been careful, but the product he has produced is the very safest product that was possible at the time it was produced; the technology of the

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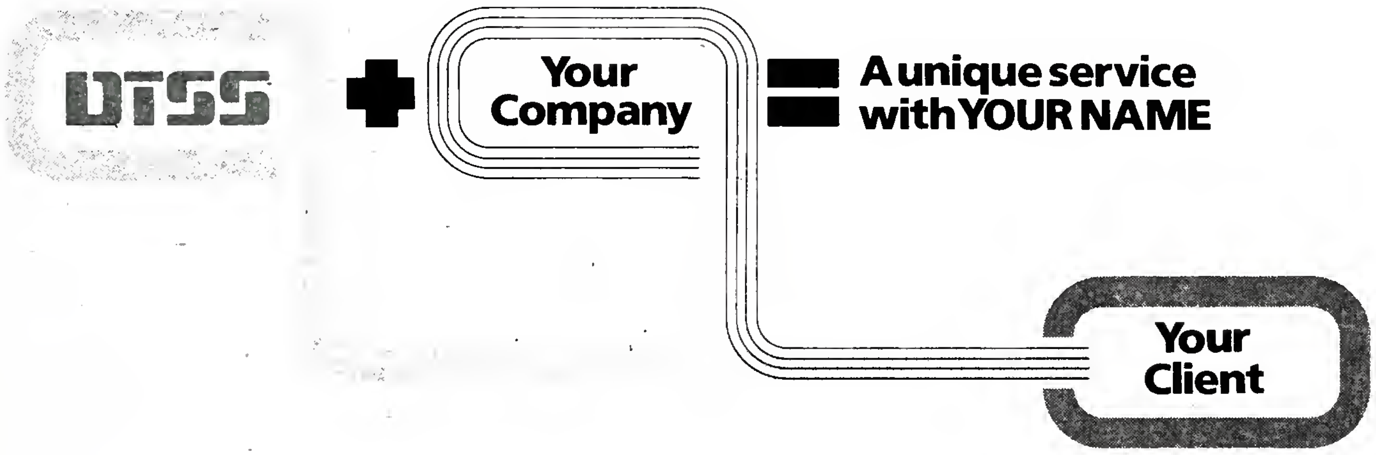

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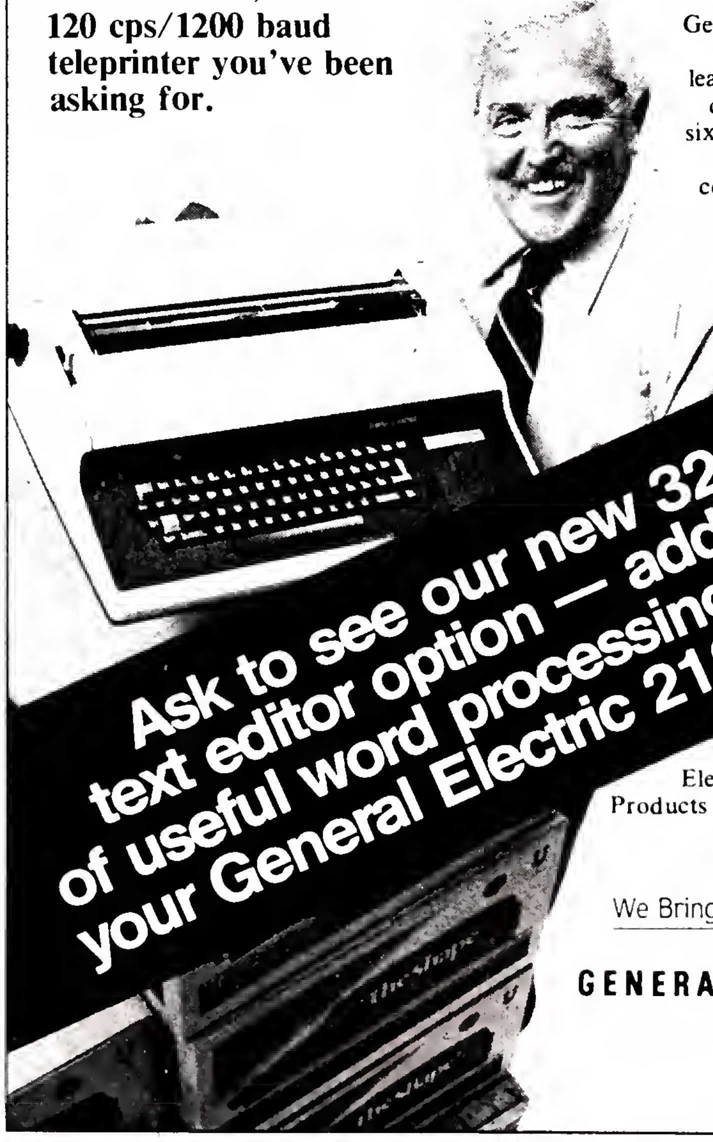

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Defamation is another theory under which a programmer might be sued if inadequate security allows certain types of information to reach unauthorized persons or if errors in the program or data base provide false information injurious to some individual or corporation. One defense that applies in most instances of alleged defamation is the truth of the defamatory statement. The burden of proving a defamatory statement true rests upon the defendant who published it, but if its truth can be shown, that defendant will usually prevail.

Truth, however, is not necessarily an adequate defense in an invasion-of-privacy action. Indeed, a distinguishing feature between defamation and false light privacy is that in false light privacy, the injurious statement is true. Moreover, in certain instances of reckless or malicious conduct, the truth of the defamatory statement may not even act as a shield in a genuine defamation suit.

The various immunities and privileges that can be raised in defending against a defamation action are so complex that nowadays even a specialist in constitutional law has trouble keeping them straight. A person's right to privacy and a good reputation can conflict with the constitutional right to speak out, or to a free press.

Likewise, some persons have a right to learn certain information about others, even when such information may be defamatory, or perhaps even inadvertently false. A store has a right to know the credit reputation of someone seeking to make an expensive purchase on time. An insurance company has a right to learn whether someone seeking life insurance is an alcoholic.

Qualified Privilege

More often than not, information stored in computer files would be subject to a qualified privilege. An absolute privilege absolutely protects the defamer even if the statement at issue is entirely false and is made recklessly and with malice. Any statement made in the context of a judicial proceeding that is actually pertinent to the proceedings is absolutely privileged. With the increasing the use of computers in litigation support, it is not clear to what extent this privilege will extend to data bases kept by law firms for use during a trial. It might be argued that data accessed through some government computers, say for use in a legislative process, is also absolutely privileged.

A qualified privilege is a privilege that exists under certain circumstances. A qualified privilege cannot be invoked if a statement is made maliciously, but it can be invoked if a statement is made without malice in the public interest or is a private communication made in the mutual interest of the publisher and a third party — for example, a report issued by a credit bureau. Although the pendulum swings back and forth, the privilege currently enjoyed by news media is also absolute, barring the presence of true malice or an utter and reckless disregard for the truth.

Even when a statement is defamatory and injurious and defamation as such is manifestly present, most courts will find that the damage is considerably mitigated and hence there is less liability if a prompt retraction or correction is published in such a way as to reach those who might have learned of the defamatory information.

The first three parts of this series looked at some of the legal theories under which programmer liability might be found. This part has surveyed some of the defenses that might be raised against those theories.

The best defense of all occurs before trial, indeed, before there is even talk of a trial. It consists of knowing the legal pitfalls that may lurk in a particular area and using common sense and care to avoid them.

Good legal advice when drafting a contract is a "must." Care in writing and testing software and in promising no more than you can deliver is not only good law, it is good business. This writer believes that computer-related law must become as important a part of any computer science curriculum as business law already is in any business management program.

About the Author

Michael C. Gemignani holds a Ph.D. from the University of Notre Dame and a J.D. from Indiana University. Formerly chairman of the Department of Mathematical Sciences at Indiana University-Purdue University at Indianapolis, he is currently dean of the College of Sciences and Humanities at Ball State University.

Gemignani is a consultant on computer-related law and has given many presentations on the subject.

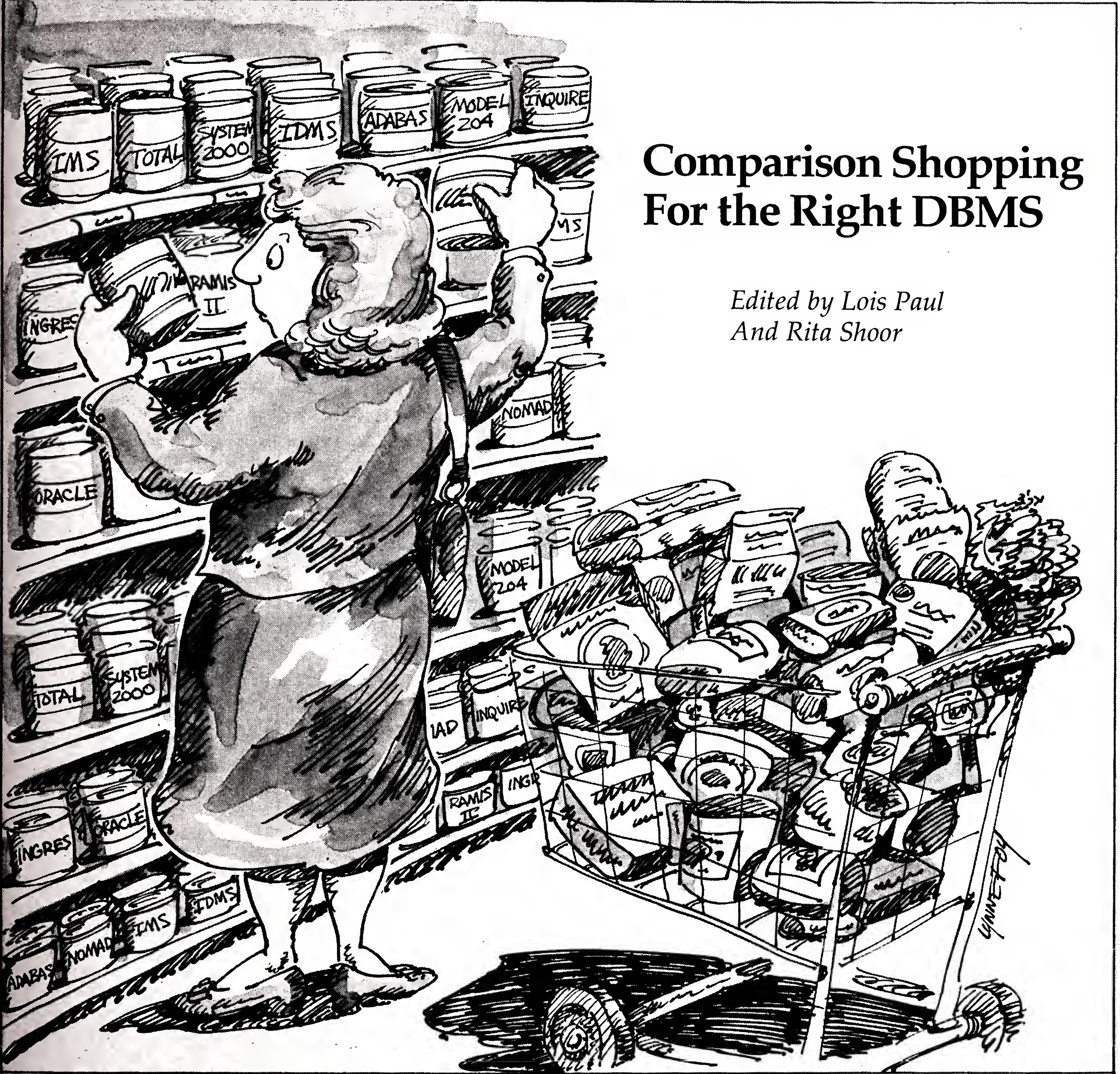
His book, Law and the Computer, *appeared last April and was published by CBI Publishing Co., 51 Sleeper St., Boston, Mass. 02210.*

November 30, 1981

SPECIAL REPORT

Comparison Shopping For the Right DBMS

Edited by Lois Paul
And Rita Shoor



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Study Sees $1 Billion U.S. DBMS Mart by '87

Vendor/DBMS	No. of Installations (1979)	Anticipated Growth Rate
IBM — IMS	1300	High
IBM — DL/1	700-800	High
Cullinane — IDMS	500	Very High
Software AG — Adabas	350-375	High
Cincom — Total	2700	Low
Intel/MRI — System 200	280	Medium to High
Applied Data Research — Datacom/DB	150	Medium
Infodata Systems — Inquire	100	Low
Computer Corp. of America — Model 204	50	Low

Frost & Sullivan's Ranking of DBMS Vendors

NEW YORK — A $1 billion U.S. market for data base management systems (DBMS) by 1987 is one of the predictions included in a new market report from Frost & Sullivan, Inc. here.

Entitled "DBMS: Services and Software Market," the 224-page document also indicated IBM is the leading DBMS vendor "by most measurements," with Cincom Systems, Inc., in second place. The study termed Cullinane Database Systems, Inc. "an exceptionally strong competitor, having the highest growth rate." Computer Corp. of America's Model 204 DBMS was described as "technically strong."

The report stated that the market, which currently is $137 million, will increase at a 30% annual rate over the next 10 years to reach the $1 billion mark in 1987. "DBMS hardware is plunging in cost simultaneously as DBMS applications are becoming more sophisticated and far-reaching," according to the report.

It singled out manufacturing applications as the primary growth sector, followed by order entry, order processing, inventory, finance and marketing.

Covering major DBMS software offerings marketed by about 75 vendors, the Frost & Sullivan report forecasted that the 45% market share held by computer manufacturers will increase to 80% by the late 1980s.

DBMS revenues obtained by the independent companies, nevertheless, will double over the next five years, the report continued. The number of DBMS installations by vendor, including projected qualitative growth rates, is listed in Chart above.

Key Industry Trends

The majority of the 17 independently developed DBMS packages are for use either on large mainframe computers, particularly IBM systems, or on Digital Equipment Corp. PDP-11 minicomputers, the study found.

"Significant developments" in small computer DBMS software will occur over the next five years, the surveyers forecasted, citing a recent DBMS that runs on Data General Corp. computers, including the Micronova. Intel Corp.'s acquisition last year of MRI Systems Corp. now gives that microcomputer company a strong DBMS foothold, the report noted.

Other key computer industry trends that the report indicated will impact DBMS markets include data communications and distributed data processing, computer graphics, turnkey system packaging and distribution and Codasyl-based DBMS offerings.

Marketing Edge

Vendors seeking a marketing edge will turn to specialized application, industry-oriented and support DBMS packages, the report predicted.

Typical of this projected trend is Cullinane's Application Development Systems, which aids novice programmers to implement a DBMS system, the report continued.

The report distinguished between a true DBMS and file management software by indicating that the former "enables data independence." According to Frost & Sullivan's surveyers, "No true relational system is yet commercially available." The report conceded the fact that some relational DBMS techniques are employed in available software. "The next generation DBMS will be relational," the report asserted.

Full copies of "DBMS: Services and Software Market" (No.A747) are available for $1,000 from Frost & Sullivan, Inc., Customer Service, 106 Fulton St., New York, N.Y. 10038.

Because of Technical Problems

Data Base Successes Not Coming Easily

By **Dr. Carl Cagan**
Special to CW

Discrepancies between a data base administrator's technical knowledge and the underlying concepts of data base and file systems can only mean trouble for a company, according to Cagan. After noting some reasons for the problem existing in certain organizations, the consultant argues the case for systems specialists who have a solid technical background.

One often hears that "hardware is ahead of software." While it is true that there is a time lag, sometimes large, between a hardware advance and the appearance of software that employs the hardware to advantage, a more meaningful statement for business might be, "Hardware is ahead of software and software is ahead of computer people."

The data base area is a case in point. Whether for technical, organizational or budgetary reasons, many companies that embrace the data base concept are unable to apply it successfully. This discussion centers on the technical problems.

There should be at least one individual in the organization — preferably two — who understands not only the data base management system (DBMS), but the basic concepts of file systems.

Whether titled the data base administrator, the information manager or the data base analyst, this is a critical position. The position may not even exist in some companies and when it is filled the person sometimes does not have the required technical background and understanding.

(Continued on SR/8)

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User Objectives Outlined

Corporate Goals Tagged to DBMS Selection

By Lois Paul
CW Staff

CHICAGO — Clearly defining the organization's objectives before beginning the selection process is a key to choosing the correct data base management system (DBMS). The alternative is similar to buying a car with a stereo, a sunroof and other options before determining if you really need them, according to Cliff Moss, vice-president of DBD Systems, Inc.

Describing the process of "Selecting Data Base Management Systems [DBMS]" at the Software Info conference here this fall, Cliff said general user objectives for DBMS are availability of information, responsiveness, consistency of data representation and flexibility of design, including the ability to change data definitions without impacting all programs.

"A DBMS . . . organizes data where individual elements are uniquely addressable and accessable," he explained. "In a data base environment, there is the chance to isolate change to those application programs that actually utilize that field. It provides the ability to define the data independence of the application program."

A DBMS is intended to provide flexible data structures, a variety of access and search methods, centralized control of the physical organization of data and hierarchical storage of data in relation to access frequency and response requirements, he continued.

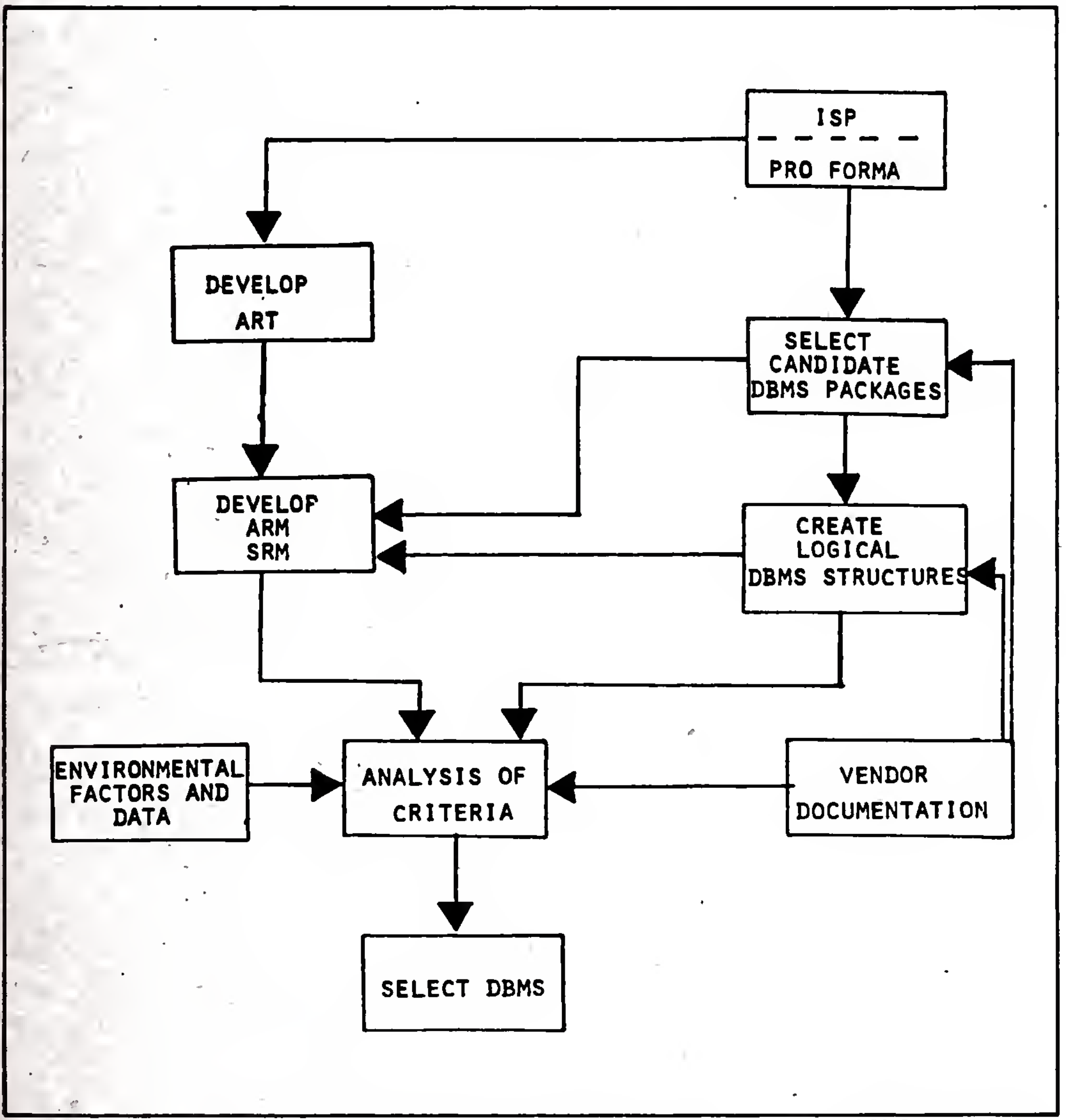
Generic features that should be available, according to Moss, include data independence of programs and devices, built-in data integrity, recovery and restart facilities, user interaction with the data base via an inquiry system or host languages and multiple update and retrieval of data.

Long-Range Plans

Because of the nature of DBMS and its long-range implementation requirements, a long-range plan is necessary in order to cost-justify this approach, Moss explained. "You have to look broader than just single applications."

He said data base management historically has been reactive, rather than focused on looking ahead and

(Continued on SR/5)


ISP
PRO FORMA
DEVELOP ART
SELECT CANDIDATE DBMS PACKAGES
DEVELOP ARM SRM
CREATE LOGICAL DBMS STRUCTURES
ENVIRONMENTAL FACTORS AND DATA
ANALYSIS OF CRITERIA
VENDOR DOCUMENTATION
SELECT DBMS

DBD Systems, Inc. Chart

Figure 1: DBMS Selection

DESIRED IMPACT	ORIENTATION/EMPHASIS
1. FINANCIAL SUPPORT	1. COST/BENEFIT - CASH FLOW ANALYSIS
2. MANAGEMENT SUPPORT AND COMMITMENT	2. + 3. CONCEPTS & POTENTIAL BENEFITS, SPECIFIC ACTION TO BE TAKEN
3. USER INVOLVEMENT AND SUPPORT	
4. EDP INVOLVEMENT AND SUPPORT	4. TECHNICAL ADVANTAGES AND POTENTIAL BENEFITS SPECIFIC ACTION TO BE TAKEN

DBD Systems, Inc. Chart

Figure 2: The evaluation/selection team's presentation of results should have an orientation and emphasis to produce a desired effect.

'Continually Refine'

CHICAGO — "Within each category, continually refine until the decision is almost a yes or a no," Cliff Moss, vice-president of DBD Systems, Inc., advised those evaluating data base management systems (DBMS).

As part of his recent presentation on selecting a DBMS, Cliff described his firm's criteria through which each vendor's product is scored from 0 to 10, depending on its capability. After a total score is obtained, two products may be close together and the selection team must analyze where weights were placed and what effect a mistaken score would make on the final scores.

In the selection criteria, the team should distribute 100 points across the four basic categories of software operating characteristics: resource requirements, ease of use and vendor support and documentation viability. The next step is to go to the sub-levels and distribute another 100 points and so forth.

What this eventually yields, according to Moss, is an objective understanding of where emphasis is placed regarding features of the DBMS. When these are multiplied out, they yield a composite score or percentage, he said.

For example, the first level would be resource requirements and the sub-levels of this category would be memory, disk, performance overhead, staff requirements and direct dollars.

An example of a factor that would effect the relative weights of these sublevels is that retrieval-based systems generally require more memory than maintenance-type systems, Moss said.

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Executive Offers Overview Of Eight Current DBMS Based on User Experience

By Lois Paul
CW Staff

CHICAGO — Once you have all the necessary data, how do you choose the right data base management system (DBMS) for your organization?

As part of his presentation on "Selecting DBMS" (story on SR/3), Cliff Moss, vice-president of DBD Systems, Inc., offered an overview of current DBMS that was completed in May and based on 20 companies where the firm was directly involved in the DBMS selection process, as the chart to the right shows. The chart is divided into first (1.0), second (2.0) and third (3.0) levels of criteria.

In the scoring key, 0 means the DBMS is a prototype that has adequate facilities and capability, a plus sign (+) signifies it handles the capability excellently and a minus sign (-) indicates a deficiency that may require additional software or specific tailoring to overcome.

Moss indicated that many pluses and minuses at the second level could be offset by other environments and software tools.

For example, low marks in the data definition/representation and data structure (criteria 1.1, 1.2) categories could be offset by the addition of a data dictionary, Moss said.

The charts indicate that Cincom Systems, Inc.'s Total has two access methods — a master file and a variable-entry file. A plus was earned by IMS because it offers more choices, including direct, count, hierarchical index directory and sequence.

Moss pointed out that having a variety of access methods can require a lot of skills and staff to manage. Because Total only has two, it will require less staffing and may be preferable for an organization that does not need a lot of access methods.

These are some of the "trade-offs" that companies should consider during the selection process, he explained.

Retrieval or inverted systems are somewhat easier to change and use, Moss said, but the user pays for this with slower access response and poorer memory facilities.

IDMS, Total and Datacom have fairly good retrieval and update facilities, he said, but IMS is strictly a designer package. Moss described Total, System 2000, Adabas, Inquire and Model 204 as being retrieval-oriented.

There is another trade-off, with organizations choosing between DBMS that require large staffs and offer extensive computer resources and those that offer fewer resources, but also require fewer people.

There are trade-offs between vendor support and facilities. If certain interfaces are not available in category one of the DBD list, a user may be able to get help from the vendor to provide these on a custom basis, Moss said.

DBMS is a valuable tool, but is not the answer, Moss said. "It does not solve mismanagement problems.

"Properly utilized, it is an excellent tool for implementation and control and to help manage software change in your installations," he added.

CRIT. NO.	CRITERIA \ RELATIVE SYSTEM RATINGS	IDMS	TOTAL	S2K	ADABAS	INQUIRE	M204	DATACOM	IMS	RELATIONAL
1.0	FACILITIES & CHARACTERISTICS									NO CLIENT EXPERIENCE
1.1	DATA DEFINITION/REPRESENTATION	+	0	+	-	-	-	-	-	
1.2	DATA STRUCTURE	0	0	-	0	0	0	0	-	
1.3	ACCESS METHODS/STORAGE TECHNIQUES	0	-	0	0	0	0	0	+	
1.4	SECURITY, INTEGRITY	0	-	-	+	0	0	-	0	
1.5	OTHER CAPABILITIES, FUNCTIONS	-	-	-	+	-	0	+	0	
1.6	SOFTWARE INTERFACES AND OPERATIONAL CHARACTERISTICS	+	0	0	+	0	0	0	+	
2.0	EASE OF INSTALLATION, USE, AND CHANGE									NO CLIENT EXPERIENCE
2.1	EASE OF INSTALLATION	+	+	0	0	0	0	-	-	
2.2	EASE OF USE	0	+	+	0	0	+	-	-	
2.3	EASE OF IMPLEMENTATION FOR CHANGE AND GROWTH	0	+	-	+	0	+	-	-	
3.0	VENDOR SUPPORT & FACILITIES									NO CLIENT EXPERIENCE
3.1	MEMORY	0	+	+	-	-	-	-	-	
3.2	DISK	0	-	-	+	0	0	0	0	
3.3	PERFORMANCE OVERHEAD	0	0	0	0	0	±	0	0	
3.4	STAFF REQUIREMENTS	0	+	+	0	0	+	0	-	
3.5	DIRECT DOLLARS									

DBD Systems, Inc. Chart

Analysis of Criteria

Back-End Data Base Units Heralded as Way of Future

CHICAGO — Trends in data base management systems (DBMS) were examined by Cliff Moss, vice-president of DBD Systems, Inc. during a recent presentation on "Selecting DBMS" (story on SR/3).

Distributed data base support is loudly touted, but rarely implemented, Moss said. However, back-end data base computers such as those offered by Intel Corp., Britton-Lee, Inc. and Software AG are a "way of the future," he maintained.

This currently is a "push-pull" situation, Moss explained, but it starts to make sense in a multivendor environment because multiple hosts from different manufacturers could conceivably talk to the same back-end computer.

Relational data bases are "inappropriate," in Moss' way of thinking. "All it says is for any given key in a row, I have certain fields that are associated uniquely to that key.

"A true relational construct has no built-in structure. Only individual entries are available for access by field, row and column," he added.

Because every view is independent, a relational DBMS cannot be justified unless one does a lot of retrievals, Moss said.

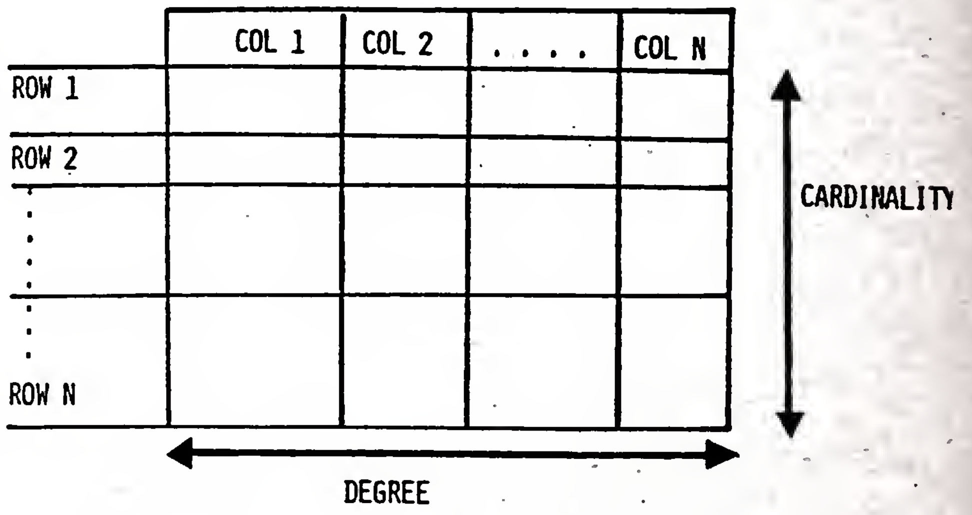
Advantages would be a powerful retrieval capability and dynamic addition of the network structure without impact on existing relationships, he said.

"A true relational construct has no built-in structure. Only individual entries are available for access by field, row and column.

"Because every view is independent, a relational DBMS cannot be justified unless one does a lot of retrievals."

The disadvantages are that relational DBMS are still in the development/prototype stage, Moss said. Potential exists for increased data redundancy over current DBMS and structural data independence is not provided, he added.

THE RELATIONAL MODEL



- NON-MATHEMATICAL DEFINITIONS
  - ROW - A TUPLE (I.E., RECORD)
  - DOMAIN - THE WAY A COLUMN IS EXPRESSED E.G., IF THE COLUMN IS SALARY, THE DOMAIN MIGHT BE DOLLARS
  - KEY A COLUMN OR COMBINATION OF COLUMNS WHICH UNIQUELY IDENTIFIES A ROW

DBD Systems, Inc. Chart

Relational Data Base Systems

Moss Ties Corporate Goals to DBMS Selection

(Continued from SR/3)

planning. For example, if a company has an accounts payable and receivable system, a question should be whether the DBMS will support these packages.

It is important to determine the degree of sharing data and the growth and change of the data base to determine if a DBMS is needed, Moss said.

"A fully integrated data base just is not practical," he said. The important issues are not where the data is, but how it is accessed.

He described an information systems plan (see Figure 1 on SR/3) that should involve a three- to five-person team to select the DBMS that represents planning and system analysis, programming, systems software, operations and the user community.

"You get the different points of view and do not end up with a piece of software because a 'techie' wants it on his resume or because a user feels it was easy to use and does not care about the problems it represents in implementation," Moss said.

DBMS Selection

A first step in approaching DBMS selection is identifying generic capabilities and the features and functions you need performed, he said. "Find out what hardware and software resources are required to implement the DBMS software."

This analysis narrows the choices and gives vendors a better shot at presentation of their products, Moss explained. "The more specific you can get before calling in vendors and presentations, the better."

The next step, according to Moss, is to eliminate the vendors whose products do not meet very basic requirements — the ability to run in your hardware environment, for example.

Once past the "must criteria," the selection team must determine the most important features to the organization and look at the "tradeoffs" involved. These should be weighted at each criteria level, Moss said.

Four categories that must be examined are the operating characteristics of the software, machine resource requirements, ease of use and vendor support and documentation viability.

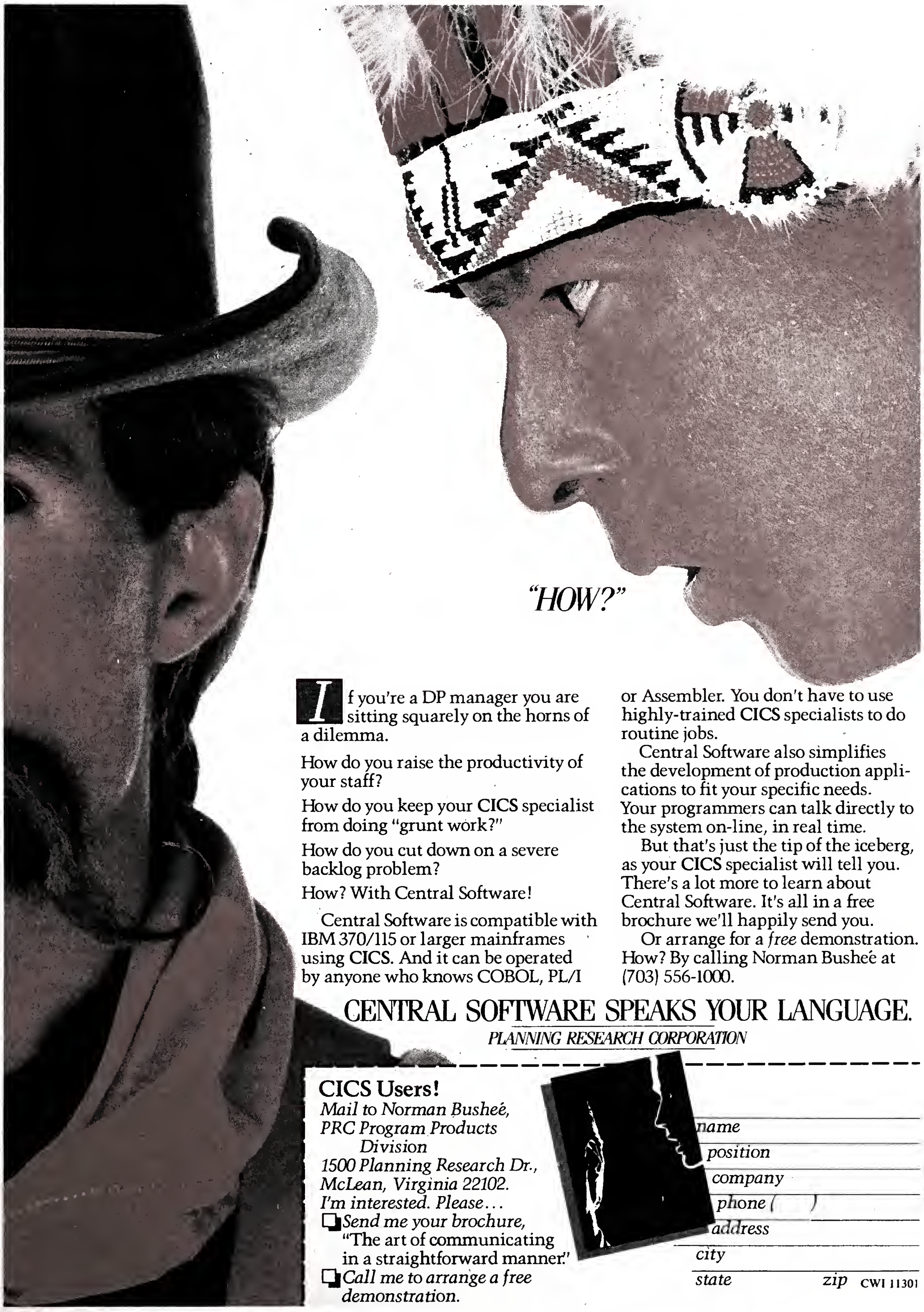
When final scoring results are in, the selection team should get a set of documentation from the vendors that can be used in the evaluation.

At this time, address the remaining questions, such as multisite discounts and the development strategy, he advised. Also important, according to Moss, is a sound assessment of the risks involved and a cost/benefit analysis.

Benchmarks should be done on paper, he said, analyzing features and assessing performance. He cautioned that a benchmark is only as good as the specifications and the controls you place on it.

The selection team should also make presentations to appropriate groups (see Figure 2 on SR/3).

Choosing a DBMS is more a business decision than a technical decision, Moss noted. If the choice is based on technology alone, it may be inappropriate for the future characteristics of the company, he explained.



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DBMS Helps Accelerate Auto Group's Goals

SAN ANTONIO, Texas — The installation of a data base management system (DBMS) in an organization impacts many people, ranging from end users to programmers to the data administrator. The United Services Automobile Association (USAA) here described the effect of its DBMS on these various departments as part of its corporate goals of improving customer service, increasing employee productivity and computer data availability and management decision-making effectiveness.

Early in 1973, USAA selected and installed IBM's IMS DBMS for its data base/data communications system, according to Richard L. Costello, USAA's director of data administration.

The first data base at USAA was designed to eliminate the need for redundant customer data and to provide selected information on-line, one of the company's users reported. (See chart).

Previously, if a customer's address was updated on one record, it was necessary to notify other departments so that all records including that data could be updated. "It worked out very well . . . We decided that if the DBMS could do this much, then it could do more," he said.

Additional programmers and systems analysts were hired, more systems went data base and more information became available on-line, Costello continued.

Impacts of DBMS

The users have almost given up the paper file, he added, and that has not been the only impact. In the pre-data base era, a typical insurance task, such as processing an application for automobile insurance, traveled through 55 workstations and 14 organization units. Today that same task is touched by three workstations or fewer and passes through two organizational units, he explained.

Many programmers and analysts have been involved in the design and development of the various systems that support these data requirements, the user said. Conversion programs had to be implemented to make cross-systems interface data compatible.

In resolving conversion conflicts, we became acutely aware of the necessity for users to apply sound data management principles in line with our growing DBMS, the user explained.

"We've learned that a key to a successful DBMS is the proper identification, standardization and documentation of our corporate data. It is through these efforts that we are best able to communicate with the computer, with other employees, and most important, with our customers," he added.

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Maximum Throughput Observed	16 messages/sec
Region Occupancy	90%
CPU Utilization	98%
Data Base Calls per Transaction	13.5
Data Base I/Os per Transaction	3.8
Total Calls per Transaction	17.2
Elapsed Time per Transaction	.388 sec
CPU per Transaction	22 msec
Operating System Paging	5 frames/sec
Response Time: System Average	< 3 sec
97%	< 5 sec
99%	< 7.5 sec
Average Daily Capacity	500,000 transactions/day
Capacity Estimated to be	600,000 transactions/day

The U.S. Automobile Association's Experience

When IMS was installed at USAA, the programmers there were told that some of the data they had been retrieving from processing tape and disk files was going to be stored on data bases.

"We would be able to read a data base in any order and only process those records that required processing. We would not have to worry about opening or closing the data base files. We did not have to include JCL for the data base. IMS would provide recovery and security capabilities," one of the programmers commented.

Overcoming Problems

The USAA management realized that the way to overcome skepticism among the programmers was to provide the necessary training for its personnel and to have a qualified IMS support team. So, with training and some experience, a better understanding of IMS came along and the doubts and fears associated with magical qualities gradually disappeared, Costello explained.

Another problem encountered along the way with USAA's DBMS was the creation and maintenance of some very large data bases. After eight years with a DBMS at USAA, the programmer conceded that the decision to go with a DBMS environment has been a good one.

A different perspective of and procedure toward design, implementation and control of IMS projects was needed, the programmer continued, and performance tuning is an on-going activity. He also noted that a highly trained, competent and dedicated recovery team is essential for IMS systems recoveries and company dependence on DBMS availability and performance has significantly increased.

As the newly assigned data administrator at USAA, Costello determined that his first step was to obtain a road map. This was developed to address data from three flanks: data to be used in newly developed systems, data used in existing systems and data that was going to be used by end users in a distributed data processing environment.

Goals Defined

The road map consisted of data management goals, strategies to achieve those goals and specific measurable objectives that are re-evaluated and updated annually.

The first goal was to identify the data USAA needed to do business, Costello explained, and this required taking inventory of data existing in automated and manual systems, forms and reports and documenting new data needs as they occur through new system development and current system enhancements.

The second goal was to make data easily available to those who need it. For this, Costello determined it was necessary to provide data dictionary reports on data elements and relationships, project documentation and copybook usage; and system and business process change impact analyses.

Another need was design of a global logical data structure, including the methodology and implementation procedures, as well as categorization and administration of primary vs. secondary data requirements.

To enhance the accuracy of data, Costello's department needed to ensure the synchronization of multiple data occurrences, administer data edit requirements and identify all data relationships.

For the next goal of contributing to the productivity of those who process data, it was necessary to maintain detail logic and data tables external to application programs, design logical to physical data paths and provide information on data definitions, contents and addresses.

To protect and secure data, it was necessary to centralize copybooks to protect data from unauthorized changes. Other steps included performing data base generations to control access to IMS data, Costello explained.

The final goal was to minimize the cost of processing data. To reach this end, Costello decided to provide training and information to ensure full use of data administration and to provide programmer/analysts with standard data attributes to reduce conversion programming requirements.

Costello said USAA's DBMS is making life easier and more productive, as well as creating problems that never before existed. However, each problem solved creates new opportunities that allow DP to better contribute to the overall corporate goal of providing customers with the highest quality service at the lowest possible price, he said.

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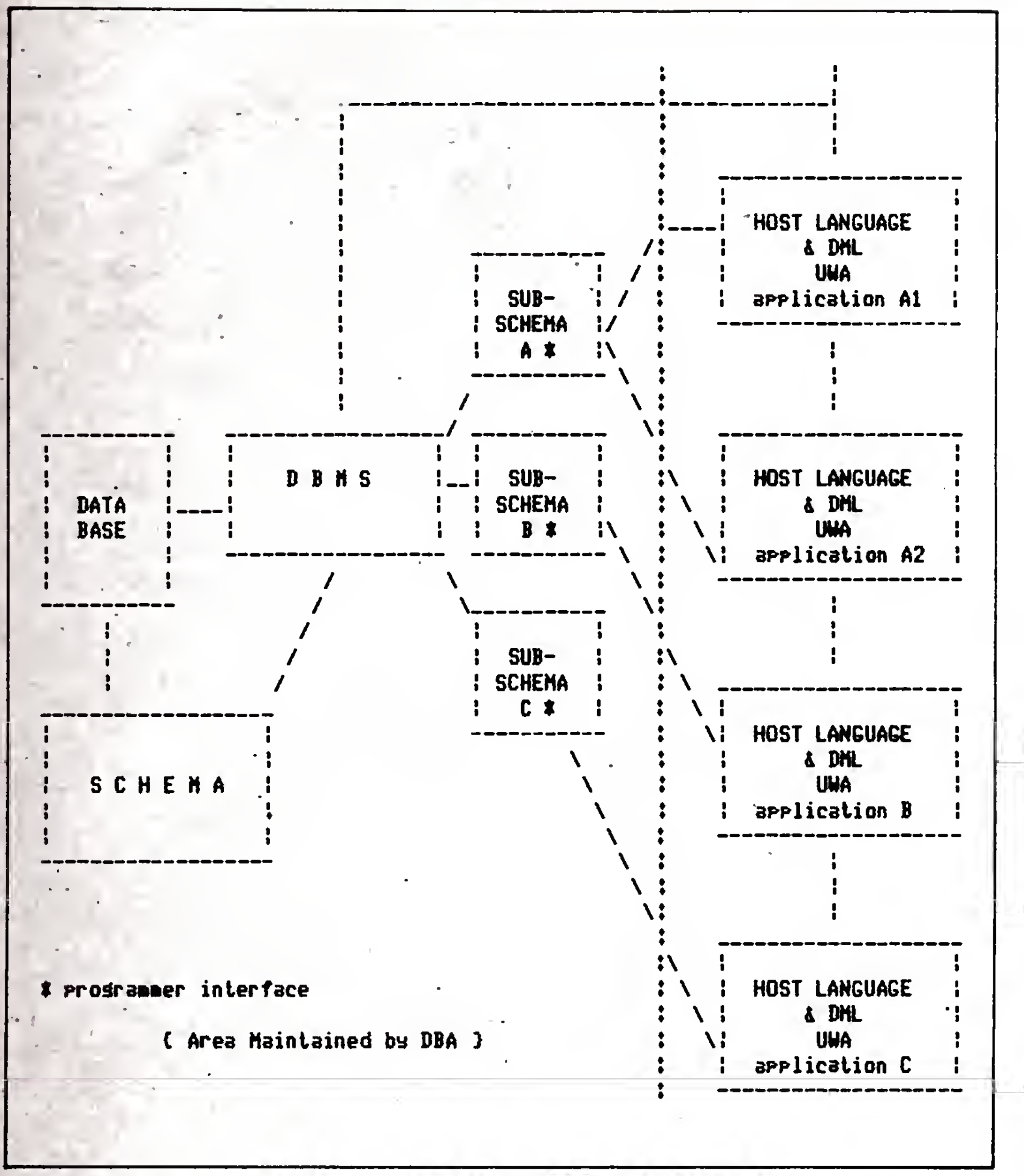
DATA BASE
D B M S
SCHEMA
SUB-SCHEMA A *
SUB-SCHEMA B *
SUB-SCHEMA C *
HOST LANGUAGE & DML UWA application A1
HOST LANGUAGE & DML UWA application A2
HOST LANGUAGE & DML UWA application B
HOST LANGUAGE & DML UWA application C
* programmer interface
(Area Maintained by DBA)

Figure 1: A Typical DBMS Architecture

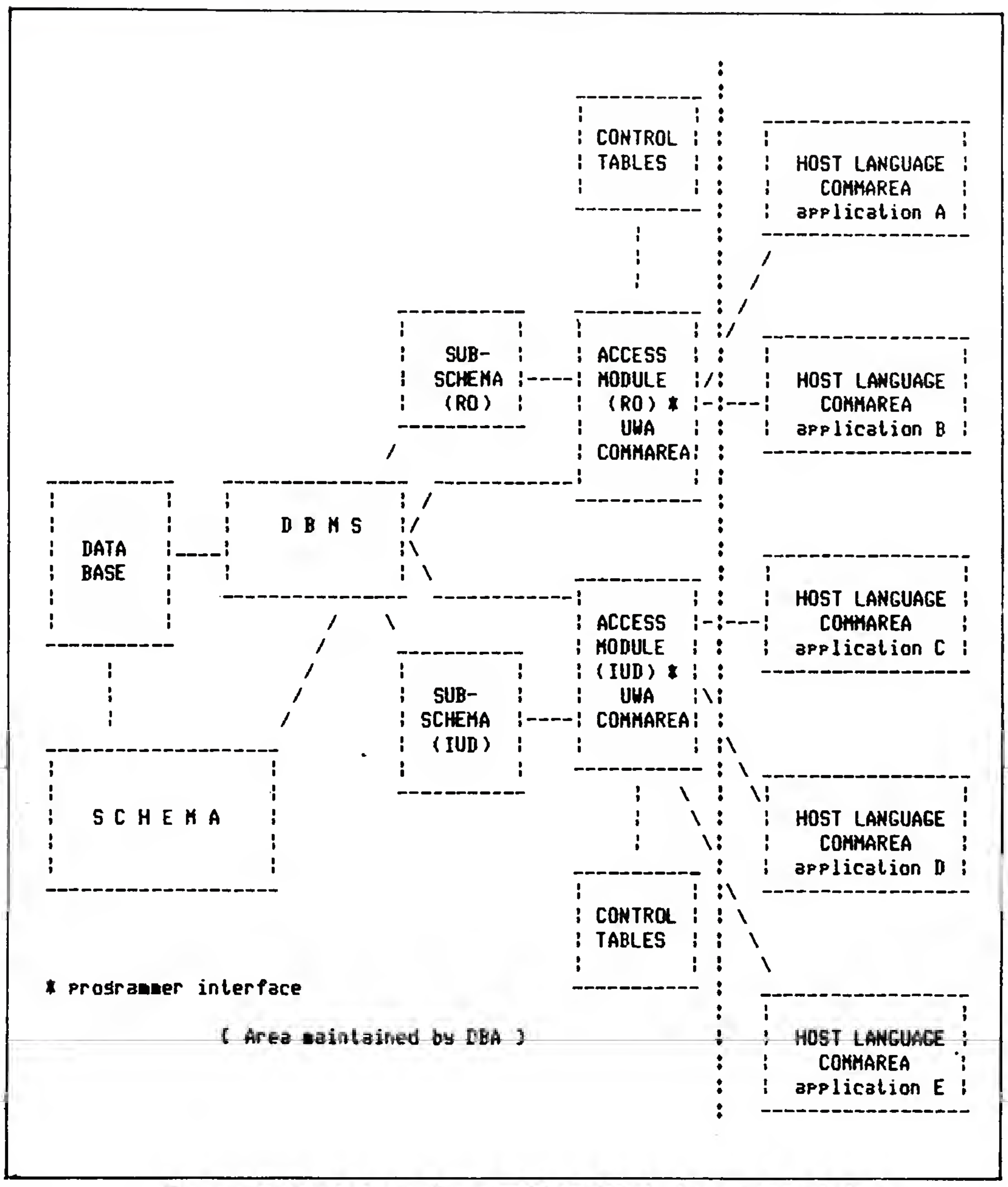
DATA BASE
D B M S
SCHEMA
SUB-SCHEMA (RO)
SUB-SCHEMA (IUD)
CONTROL TABLES
ACCESS MODULE (RO) * UWA COMMAREA
ACCESS MODULE (IUD) * UWA COMMAREA
CONTROL TABLES
HOST LANGUAGE COMMAREA application A
HOST LANGUAGE COMMAREA application B
HOST LANGUAGE COMMAREA application C
HOST LANGUAGE COMMAREA application D
HOST LANGUAGE COMMAREA application E
* programmer interface
(Area maintained by DBA)

Figure 2: Prototype for a DBMS With Access Modules

DBMS: Making It Easy for Programmer, User

BOSTON — How does an organization isolate its application programmers and users from the complexity of its data bases and the data base management system (DBMS) technology necessary to maintain them?

From the very earliest data file management systems to the current state-of-the-art in DBMS, there has been a consistent migration in this direction, according to Jacqueline A. Stewart, a data base specialist for Keane, Inc.'s Professional Services Group here.

One method of achieving this heightened degree of isolation is through the implementation of an access module that acts as an interface between the data base and the applications, Stewart said. The examples that appear in the following discussion pertain to Codasyl network data bases, but conceptually are appropriate for other approaches also.

A typical DBMS architecture (Figure 1) consists of the data base, the structure and organization of which is defined in the schema. The DBMS is the controller that accesses both the data base and the schema and represents the interface between them and the subschemas or individual user-logical views, Stewart explained.

The subschemas are the interface between the DBMS and the application programs. Of these objects, the data base, schema, DBMS and subschemas constitute the area maintained by data base administration, she continued.

The application programs consist of host language instructions, data manipulation language commands and a user's work area, which contains, among other things, a copy of the subschema items, records and area definitions in a format that conforms to the host language requirements.

In this environment, the application programs are responsible for navigation of the data base, the imposition of any security and protection requirements beyond that offered by the particular operating system, network packet handling, integrity checking, message handling and statistics gathering, Stewart said.

Many of these activities are common problems to a number of applications and represent a great deal of redundancy in the system, she said. Added to this are the difficulties associated with training a programming staff to be facile in all of these areas, she added.

Under these conditions, it can be a nightmare to data base administration to maintain protection and integrity of the data base, Stewart maintained. Because of this, the concept of using the access module or modules to increase the isolation of the applications from the data base —thereby reducing the programmers' need to understand data base navigation and access — is becoming increasingly popular, she said.

Prototype Architecture

A prototype architecture for DBMS with access modules is suggested in Figure 2. The relationship among the data base, schema and DBMS remains as defined earlier. However, things begin to differ with the definition of the subschemas, Stewart continued.

It is possible to define only two subschemas, one for read-only applications and another for insert/update/delete applications, she said. Each of these subschemas is used by an access module that consists of transaction processing logic, the user's work area and a communications area, which allows variable information to be passed back and forth to an application program.

Access Modules

The access module utilizes control tables that consist of transaction definitions, which are all maintained by data base administration, Stewart said.

The access modules are the application program interfaces with the data base. The application programs consist of host language instructions and a communications area. The need for specific knowledge about data base techniques is removed from the application programmer, she explained. Instead, this burden, and the appropriate burden of data base protection and integrity, is properly placed in the bailiwick of data base administration.

The implication is that data base administration must include a small team of specialists whose responsibility would include defining the navigation and maintenance of the data base. An advantage in doing this is to allow easy restructuring to take place as well as to avoid redundancy throughout the system, she continued.

Any given data manipulation language command, along with associated logic, exists only once in the system, Stewart said. Maintenance is greatly simplified. In addition, all of the tasks associated with the application programs in the first DBMS architecture described earlier, which are not specifically application tasks, are centrally handled within the access modules, she added.

A transaction in this sense may be defined as a block of statements formulated as a decision table comprised of steps. Each step directs the performance of a section of logic that relates to data manipulation language, message handling, network packeting, security scrutinization, integrity checking and statistics gathering, she explained.

The individual transactions are invoked via the communications area of the application programs, according to Stewart. The procedure for invocation may consist of nothing more than passing a single request code to the access module, she said. The task is performed by the access module and any relevant information is returned to the application program via the communications area.

Access Module Benefits

The benefits of using an access module include tighter control, security and integrity of the data base, she maintained. Applications can be programmed and maintained by a programming staff of generalists resulting in the removal of, or at least a drastic reduction in the need for, the applications staff to understand data base data manipulation language, currency and navigation.

Programs are shielded from changes in the data base, allowing for more flexibility in the design and structure of the data base. The risk involved in using data base technol-

(Continued on SR/8)

Technical Problems Limit Data Base Successes

(Continued from SR/2)

This problem situation may stem from one of several sources:

- Qualified individuals could not be found or could not be paid sufficiently attractive salaries.
- Upper or middle management did not think the position was significant.
- Management was unable to budget the position.
- The company entered the data base area without allowing time for adequate planning or staffing.
- Management was sold on a DBMS with assurances that it could be employed on a turnkey basis once the data base was designed and installed by the vendor.
- The complexity of the data base effort was not appreciated either by management or the technical staff.

Still Not Possible

Even with high-level query languages and data base software tools, it is simply not possible at this time to implement a data base properly — in a manner not wasteful of computer time, storage and of end-user effort — unless there is an understanding of some basic concepts.

In the file area, the list includes sequential, hashed, indexed- and linked file structures; sequential- and random-access methods; logical and physical data records; data and record decomposition (normalization); internal and external sorting; and searching techniques.

There should also be an understanding of processing options such as high-level language programming; language preprocessors for a procedural language such as Cobol or for a design language; file processing systems; design systems and tools, such as application generators; and DBMS.

One of the processing options will usually be indicated as "best" (that is, economical or efficient) depending on company objectives and DP requirements for a given system.

If a DBMS is selected, the data base person should understand the data base structures and access methods supported, the language options, data restructuring methodology, data protection and recovery mechanisms and high- and low-efficiency characteristics and conditions.

In summary, why adopt the DBMS approach unless the company wants to accomplish one or more of the following: reduction in data redundancy, data integration, data relationships, data independence, demand reporting, ad hoc query processing, generalized application processing or high-level end-user interface options.

The above objectives cannot be achieved by merely purchasing a DBMS. Technical expertise will be required first to understand the objectives and second, to arrive at successful system implementation.

Cagan is president of Data Management Systems, a data base consulting company in Encinitas, Calif., and has been in the computing field in industry and teaching for 26 years.

DBMS Can Be Made Easier

(Continued from SR/7)

ogy is greatly reduced by placing the responsiblity for data base access and the imposition of standards in the hands of a few specialists who are part of data base administration, she explained.

Should the need arise for migration from one DBMS to another, the centralization of all the data manipulation languages and subschemas in the access modules would ease the task considerably, according to Stewart.

The contraindications for the access module approach include the increased overhead incurred by the use of an additional interface and a corresponding degradation in system performance, she said.

Really Needed?

There are opponents who feel that structured analysis and programming techniques suffice to provide the required integrity and protection, Stewart added. Direct use of the data manipulation language in each application is more efficient. A team of data base specialists is required to maintain the access module. The knowledge of DBMS is distributed when more programmers have the opportunity to be exposed to state-of-the-art DBMS technology, she added.

On the whole, it was Stewart's experience that those who opted to go with the access module approach have been very satisfied with the results. The most important consequence of using this interface is that the enterprise's most valuable asset, its data, receives a maximal amount of protection, she said.

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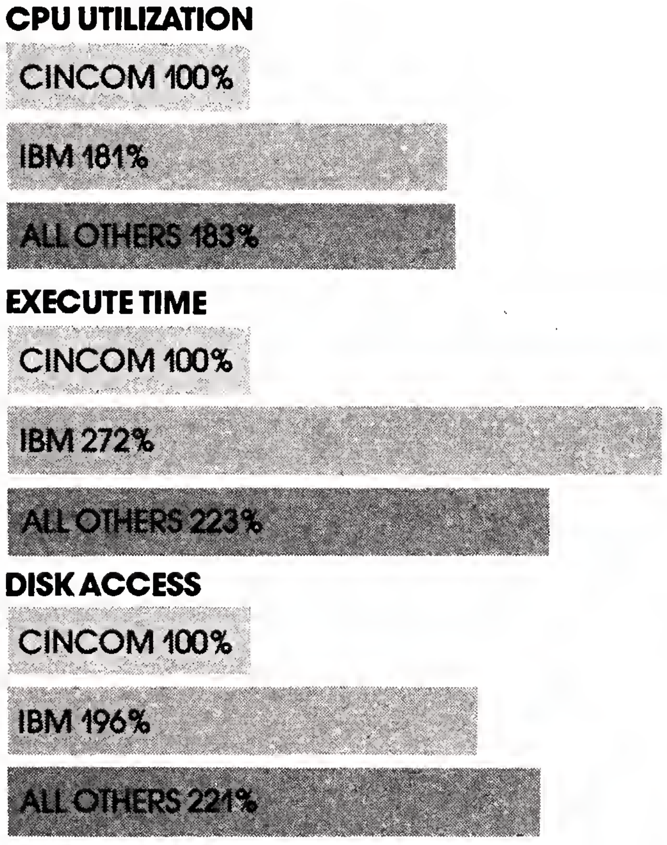

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* IDC reports August, 1980; March 1981

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University With Supermini Draws Up Five-Year Plan to Cut Production Effort

ELLENSBURG, Wash. — A five-year plan established by Central Washington University (CWU) here was designed to reduce its production effort by 40% to 50% and provide maximum flexibility in information systems being developed on its Digital Equipment Corp. VAX-11/780 supermini.

"We intend to accomplish this ambitious goal through the use of systems software tools such as screen/forms manager, an ad hoc query and report writer and data base management," Leeland G. Davis, manager of systems support, explained.

Prior to acquiring the DEC VAX-11/780 system, the university used its own PDP-11/45 under the RSTS/E operating system and the remote services of an Amdahl Corp. 470 V/8. Currently, CWU is converting various batch OS Cobol packages to the VAX system, including accounting and payroll.

The PDP-11/45 will continue to be used for various on-line student information systems, including admission, classes and grades. Plans call for the PDP and VAX systems to be loosely tied together and to pass files between themselves until a redesigned system can be developed on the VAX.

CWU's VAX-11/780 system includes 4.5M-byte memory, in excess of a 600M byte disk including RM03 and RM80 disk drives, and 96 ports which are used with DEC VT100-compatible Visual 100 terminals from Visual Technology, Inc.

The major systems software includes the VMS virtual operating system, Digital's Forms Management System-11 (FMS-11) screen manager; VAX Cobol 79; and Software AG's Adabas-M data base management system (DBMS).

Davis said the various data management combinations the university considered included DEC's Datatrieve query and report language with RMS-11K multikeyed Isam; Cincom Systems, Inc.'s Total DBMS and T-ask query; and Relational Software, Inc.'s Oracle DBMS.

Package Criterion

The major evaluation criteria were maximum flexibility, full DBMS facilities and proven vendor track record. A full-facility DBMS was preferred over file management, Davis said, ruling out Datatrieve with RMS-11K. There were many packages that were not from major vendors or were sufficiently new and therefore could not be counted on in terms of breadth of support.

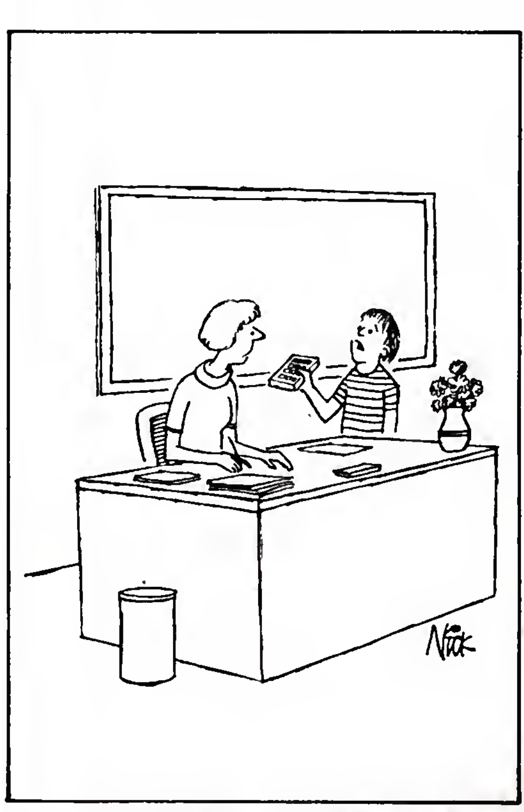
The other DBMS packages from major vendors on VAX, according to Davis, were Total and Adabas-M. "Ultimately, we knew from experience that inverted systems are much more flexible than pointer-based systems — that is, we don't know everything we're going to do and therefore cannot afford to hardwire out data structures to current requirements." Influencing the university's decision towards Adabas-M was the availability of Natural, Software AG's on-line applications programming langauge.

The university wanted maximum end-user participation in ad hoc query and report generation. To this end, there are some trade-offs because Natural will not be available until 1982, Davis explained. Since the Adascript-M query package supports retrieval based on keyed fields only, his department quickly used up the maximum of 32 descriptor keys per file. Since retrievals under Adascript-M query and report writer are limited to one file at a time in scope, they would have preferred to put a lot of data elements in each file.

Davis described the university's data base activity as a happy medium between retrievals and updates, with the add/drop period of student class admissions being the heaviest 10 days of updates.

The plan is to keep two data bases, he explained. The DEC PDP-11 includes single-keyed random-access method written in-house. The on-line systems on the PDP-11 will continue to be used for daily updates. The data will be merged into Adabas-M files. The majority of the information processing will take place on the VAX as users retrieve and massage the data using Adascript-M now and Natural later on.

The university intends to use Adabas-M's query and report-writing features to free programmer resources and to use Adascript-M query and report-writer languages, instead of Cobol, to maximize programmer productivity by minimizing maintenance work loads and reducing coding, Davis explained.



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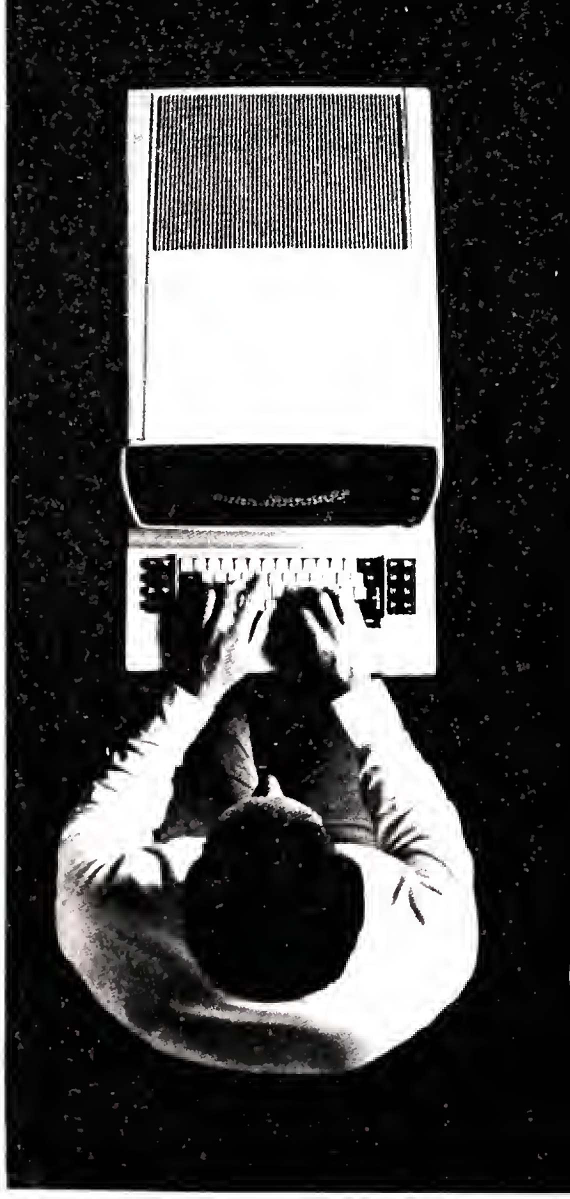

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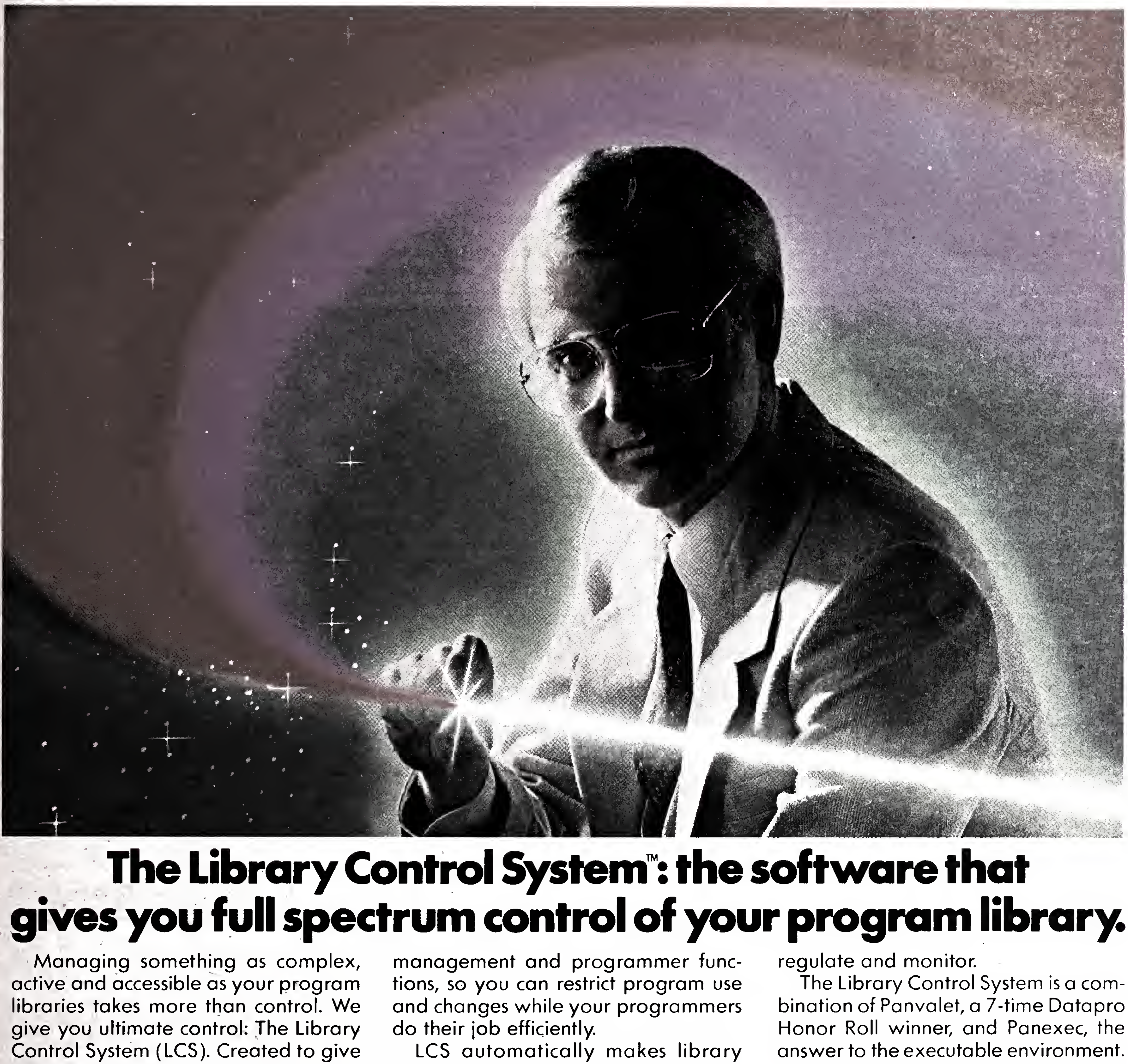

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Research Shows Nonprocedural Languages Accepted

DELRAN, N.J. — In the headlong rush toward eliminating the application program backlog, a "new" phenomenon called nonprocedural language has become accepted, according to research by Datapro Research Corp.

These very high-level languages originally evolved as the data base management system (DBMS) technology grew. With a DBMS system installed, the user now had his data organized and related so that it became easier to access, update and modify, the researchers said.

However, they found that data accessing and manipulation were still relegated to the trained technician who could write a program in some "accepted" high-level language, such as Cobol, Fortran or PL/I.

This led to the application backlog problem because whenever management needed a timely report based on information in the data bases, it required writing, compiling, testing and eventually executing the program to produce the report, the researchers continued.

With the introduction of the nonprocedural language, the end user with minimal training could use a terminal to structure the report and generate the output almost at will, Datapro said. From this point of view, the nonprocedural language approach gives the manager access to company information required to do a good job. The question remains whether it helps reduce the so-called backlog.

Reducing Backlog

If the backlog consists of systems of a procedural nature, such as payroll and accounts payable, the answer is generally "no," the researchers found. In order to effectively design and implement a successful application system of this type, the old standby high-level language approach would probably win out.

The structured nature of the procedural language allows for tailoring and configuring the intricate calculations and processing functions involved in such an effort, they said.

It also does not help when writing programs or systems dealing with communications networks, they continued, partly because there is a need for talented communications software personnel that no nonprocedural language product will ever alleviate.

One thing the nonprocedural language does accomplish is that it makes more nontechnical people appreciate what a computer can do for them. It helps the terminal manufacturers sell more terminals. It ties up more machine time, according to Datapro.

Most nonprocedural languages are dependent upon a specific DBMS data base structure, although some of the newer entries on the market claim that they can be implemented with non-DBMS files, such as a bill-of-materials file structure, they continued. By and large, the nonprocedural language allows the user to specify what information he wants, as opposed to questions such as where it is, on what medium and so on. It frequently offers the user a help function and menus. In this way, the user has literally unlimited access to the company's data bank.

Security Imperative

With this frightening aspect facing upper management, it became apparent, quickly, that some form of security had to be instituted along with the nonprocedural language capability, the researchers said. The rush was then on to incorporate security schemes into the languages. There are passwords, schema lockouts, record and/or field-level protection schemes and a variety of other mechanisms to protect against unauthorized access to data.

Most of these protection aids are affected through the DBMS, as opposed to being incorporated into the language, although more and more security measures are being moved into the language, they said. To prevent the less-than-technical user from accidently destroying data, he can be limited to "read-only" status, which enables him to look at, but not modify, the information he is authorized to see.

Unfortunately, there is no way to prevent erroneous modifications from users, they explained. Verification and check routines can be built into the language, but this imposes some procedural requirements on the user. Also, for every possible error that can be envisioned, some user will come up with one that bypasses the checking code.

The nonprocedural language concept, the researchers noted, evolved with the growth of the DBMS technology and, in fact, was initially

(Continued on SR/14)

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Hub of Development Life Cycle

Don't Ignore Data Dictionary, Datapro Urges

DELRAN, N.J. — Sometimes described as the hub of a total "system development life cycle" effort, the data dictionary's importance cannot be overemphasized, according to Datapro Research Corp.

Early in the evolution of the data dictionary concept, the product supported only widely accepted and structured data bases, specifically those created through the use of the sophisticated data base management system (DBMS), the Datapro researchers said in a recent newsletter.

IBM's IMS was one of the first DBMS's to draw the attention of the independent data dictionary suppliers. IMS was later followed by other DBMS such as Cincom Systems, Inc.'s Total; Cullinane Data Base Systems, Inc.'s IDMS; Software AG's Adabas; and Intel Corp.'s System/2000.

As time went on, the creators of these DBMS either implemented or acquired a data dictionary that they could market as an integral part of their particular DBMS, continued Datapro researchers.

Only a few independent suppliers of data dictionaries are still in the market. Among the more well-known of these independents are MSP, Inc., Synergetics Corp. and University Computing Co., all of which exclusively service the IBM mainframe operating system environment, they explained. There are others that direct their efforts to the non-IBM marketplace, such as Haverly Systems, Inc.

Data dictionaries have progressed rapidly and now can be used to control all forms of structured data, not only data bases created through the use of a DBMS, according to Datapro. Many well-established in-house data files are controlled by a data dictionary.

As data management systems became popular, management realized that the organization of data into data bases did not necessarily make it easier to control in a meaningful manner and did not always reduce the complexity of retrieving selective data in an efficient way, they continued.

Varied Benefits

The aim of the data dictionary is to help achieve these goals. These automated tools, while performing some of the same functions as the DBMS, differed in that their main thrust was in providing control over all the data resources within an organization, according to Datapro. The functions of defining, describing and controlling the definitions and descriptions of the data elements are an integral part of the data dictionary. It is not simply a cross-referencing or report-generating tool.

Many of the benefits that can be realized from the use of a data dictionary are directly related to the effective collection, specification and management of total data resources, they continued. Some of the more tangible benefits are simple and effective control of the data elements, reduction of data redundancy and inconsistency, enforcement of standards and enforcement of security safeguards and data base access.

Others include the ability to determine the impact on the total information activity caused by changes to data elements, centralization of data elements as an aid in the design and development of new systems and consistency in the documentation of the data elements.

The data dictionary/directory product is a software tool that provides the means for defining and describing the characteristics of a data base, as opposed to the contents of a data base, according to Datapro. Basically, a data dictionary contains a unique identification, a set of physical characteristics and a textual description for each of the data elements. It shows the relationships of elements to each other and to components of the system and specifies the source, location, usage and destination of the elements.

Other Features

Other features include validation and redundancy-checking capabilities, security safeguards, a command language, reporting capabilities, adhoc user-defined reports, cross-reference reports, elements-usage reports, audit-trail reports, change-effect reports and error reports, Datapro continued.

Data dictionaries generally have retrieval capabilities, such as keywording, indexing and on-line batch querying and facilities for interacting with a DBMS.

Some commercially available systems have on-line interactive capa-

(Continued on SR/14)

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Data Dictionary 'Hub' of System Life Cycle

(Continued from SR/13)

bilities and some are predominantly batch systems, Datapro reported. There is considerable difference in retrieval/reporting capabilities. Most data dictionary systems have the capability for generating data divisions or data blocks for Cobol and PL/I programs. Some data dictionaries will automatically generate program documentation and/or test data.

Security features are available in all data dictionaries, Datapro continued, although the extent and implementation of these features vary among the data dictionary systems that make use of the host system or operating system security provisions. In most instances, there is multilevel control, with the data base administrator having the highest level of control.

Some distinct disadvantages that go along with installing a data dictionary include its being very time-consuming to install, according to Datapro. The maintenance functions associated with the data dictionary may require considerable effort.

There may be user objection to the formality required by the data dictionary. Also, the current crop of data dictionaries are predominantly IBM mainframe-oriented. The purchase price of the data dictionary can range anywhere from $10,000 to $20,000, Datapro continued.

In spite of any shortcomings associated with the data dictionary concept, the advantages offered far outweigh the disadvantages, Datapro reported. More than a reference document, it is a tool that simplifies the documentation, control and management of data. It encourages the concept that data is a valuable resource.

High-Level Languages Accepted

(Continued from SR/12)

more highly visible in the minicomputer environment than in the mainframe marketplace. The professional is using the nonprocedural language approach to supplement the more procedural nature of his responsibilities. The ability to draw up screen formats interactively, without having to go through the tedious machine-interface operations of years ago, has been a definite plus for him.

There are many positive factors to be associated with the nonprocedural language approach to programming, along with some negative factors, according to Datapro.

Positive Aspects

On the positive side, the new language approach can save much time in the preparation of ad hoc or timely reports. Some estimates have shown as high as a 10:1 savings in development and test time, they reported.

It makes timely data available to the end user without requiring the DP knowledge of a programmer. It may reduce the "application program backlog," providing that backlog contains many requests for management-oriented reports that can easily be derived through the use of the language, the researchers said.

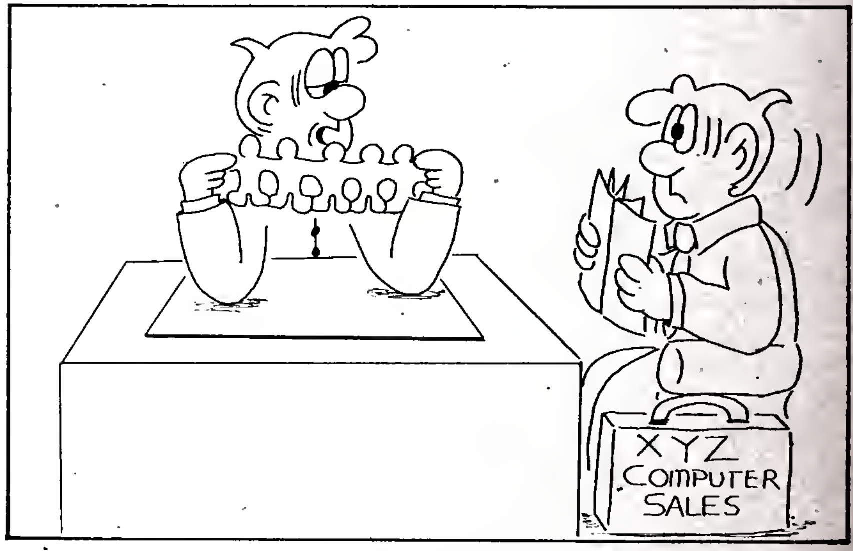
Some of the negative factors Datapro cited include less than secure updating protection; incompleteness of the language, meaning that not all the facilities exist within each language implementation to allow the user to easily and efficiently describe what functions he wants performed; and the human element, where there is still some desire on the part of the older employees to shy away from automated methods of operation.

Therefore, they concluded, the nonprocedural language is neither a boon to the industry nor a bane to the DP department. It will help reduce program backlog (if not system backlog); it might save time and money (although that is not an essential benefit of the technology); and it will enable management to get at needed information quicker and more accurately than ever before.

This last element is the greatest benefit that can be derived from the nonprocedural language, the researchers said.

The professional user of procedural languages will not be replaced, they said. In fact, the need for trained personnel will continue to be with us for at least the next five years. There are many procedural systems to be developed.

Datapro did predict a finite separation between the DP department and the end-user environment, with someone like a data base administrator acting as the liaison activity between the two.



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Ensures Data Consistency

Directory-Driven DBMS Seen System 'Brain'

CINCINNATI — The step beyond separate implementation of data base management systems (DBMS) and data dictionaries is the directory-driven system in which the directory functions as the "brains" of the overall system.

This is the view of Ron Weeks, product manager for Cincom Systems, Inc.'s Total Information System here.

A dictionary is a passive repository of definitions and even the "integrated" dictionary provides only a static level of control over the software, Weeks noted. This control includes such things as precompilers and preprocessors, which generate information into the appropriate programs before they are executed, he explained.

In a directory-driven system, the definitions are entered and stored as with the dictionary implementation. The definitions contained in the directory are used dynamically to control the execution of the other software components, Weeks said.

The separate implementation of the DBMS and the dictionary cannot accomplish this kind of dynamic control of a completely integrated software system, he maintained. Separate implementation can, in fact, add to DP problems rather than help solve them.

Through technological advancements over the past decade, DP has made progress in problem areas of data redundance and isolation from change. DBMS is not the complete solution, Weeks said, and neither is the separate implementation of DBMS and data dictionaries.

The goals of a dictionary and a DBMS are to give DP the data independence and control of a shared nonredundant data base. Today's DBMS implementations do give a level of physical data independence, Weeks said, but require redundant data descriptions and lock programs into the data structure of the overall data base.

Likewise, stand-alone data dictionaries report on who uses what data, but require yet another redundant description of data and offer little enforcement of security or change control for a shared data base, Weeks continued.

'"The definitions contained in the directory are used dynamically to control the execution of the other software components."'

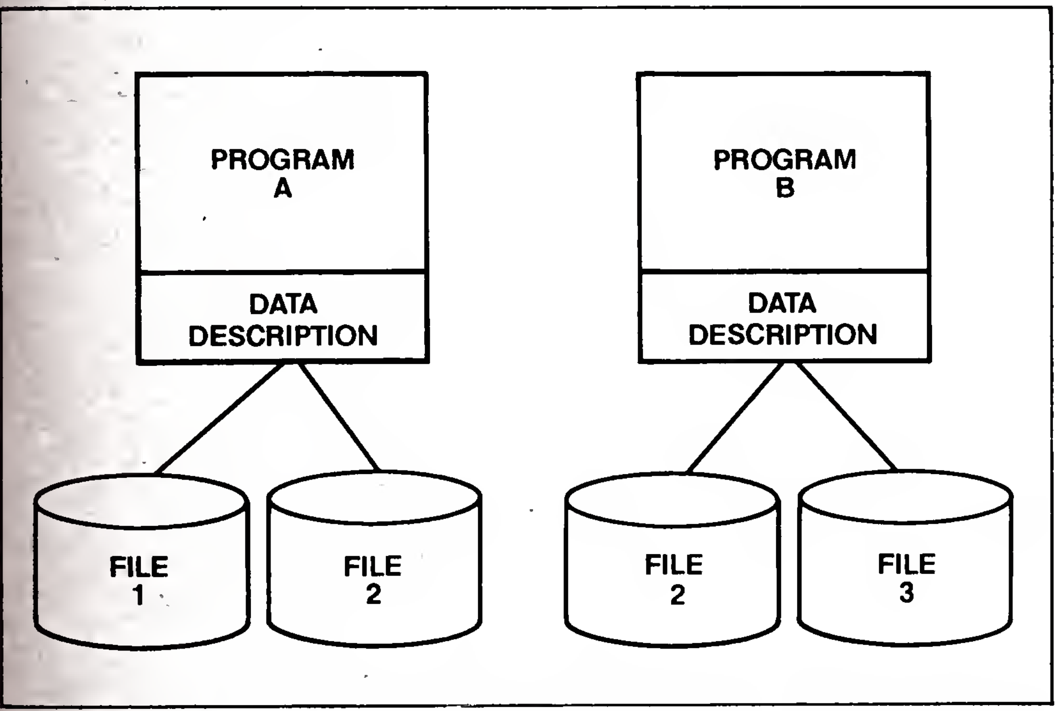


Figure 1: Before Data Base (Redundant Files and Data Descriptions)

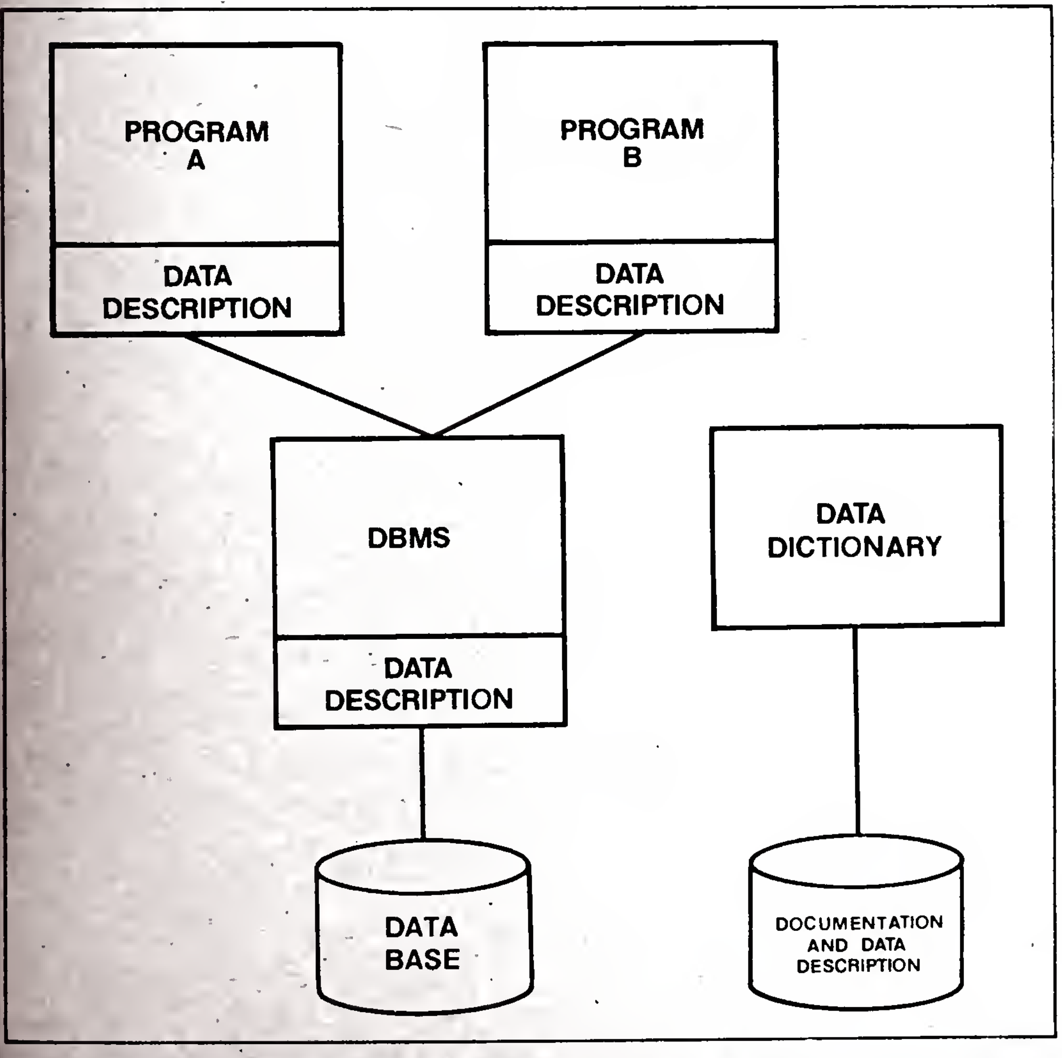


Figure 2: Separate Data Base Management Systems and Dictionary Systems (Redundant Data Descriptions)

Directory-Driven DBMS

The solution is a directory-driven DBMS that integrates it with all other system components, he maintained. This approach allows the data descriptions and security constraints to be entered once and maintained in a consistent form that is available to the DBMS for active enforcement of installation standards.

Without DBMS, application programs contain references to access methods like Isam or Bdam and physical data descriptions for the actual files, he said. The logical relationships between files are buried in the program logic.

For another application to use the files, it must first extract the hidden logical relationships and then conform exactly to the required conventions and data formats. Extracting the meaning of data from a poorly documented program is like reconstructing an ancient culture from an archeaological dig, Weeks said. He described it as a painstaking process where each line of code is an "artifact" that must be examined and understood in relation to all others.

Usually one can reconstruct the major relationships, he said, but the subtle meanings are often not understood until an innocent change affects the original application. Since even the smallest logical or physical change can have effects on existing programs, new files with redundant data are often created. (See Figure 1.)

This proliferation of separate, but similar, data continues as new applications are added, Weeks explained. This, in turn, causes multiple application programs to keep all versions the same, or the installation experiences inconsistent reporting from the multiple versions of the "truth," he continued.

Maps and Guides

Data base management systems can help control the proliferation of redundant data, Weeks said. By explicitly declaring the relationships between the data, the DBMS can maintain these relationships and do the physical access method requests for the programs. With the defined relationships, the meaning of data is now partially visible in the data structures of the data base, he explained.

Each program user can be given an explicit, predefined road map of the data base and can issue navigational directions to the DBMS instead of sifting through old programs and writing access method macros, he explained. This DBMS benefit allows many programs to share the same files and allows the physical accessing techniques of those files to be changed without affecting the program interface.

The separate, but concurrent use of data dictionaries addresses the same areas of redundant files and hidden meanings. The data dictionary approach is to organize and automate

(Continued on SR/16)

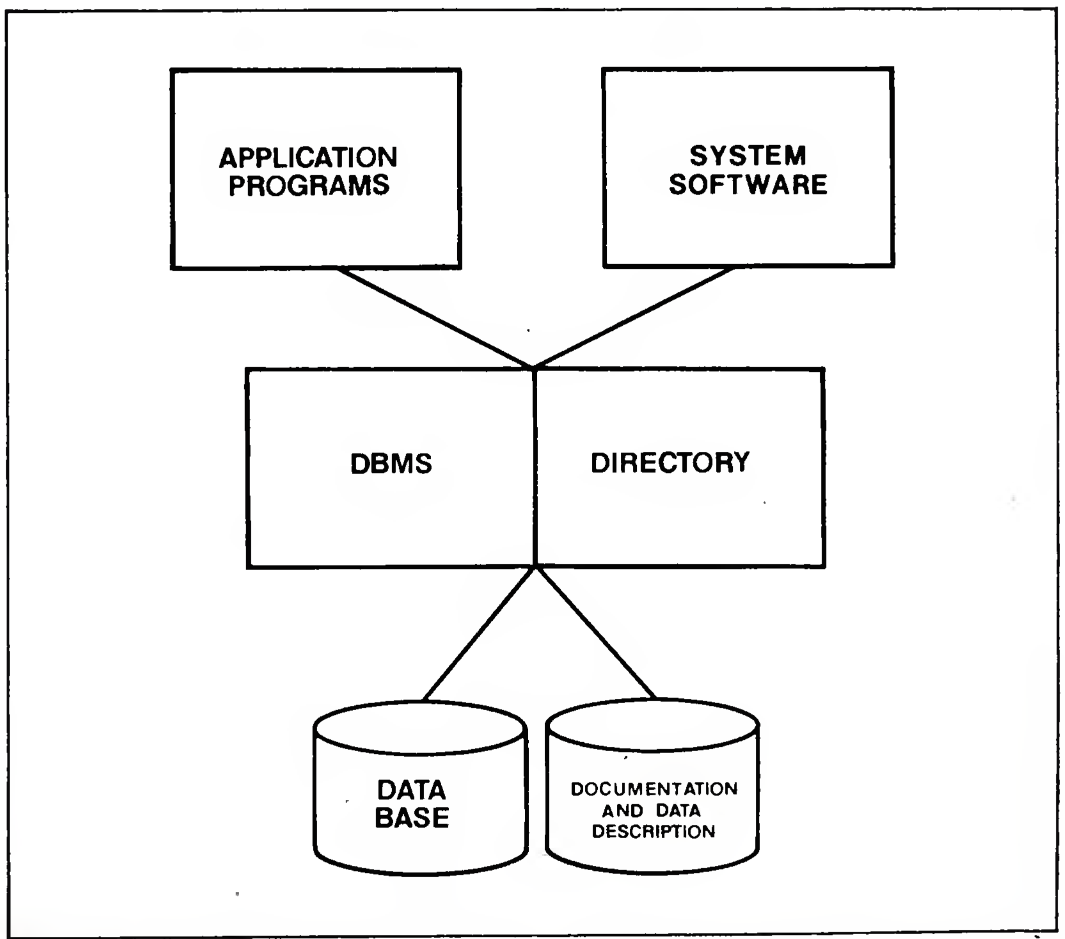
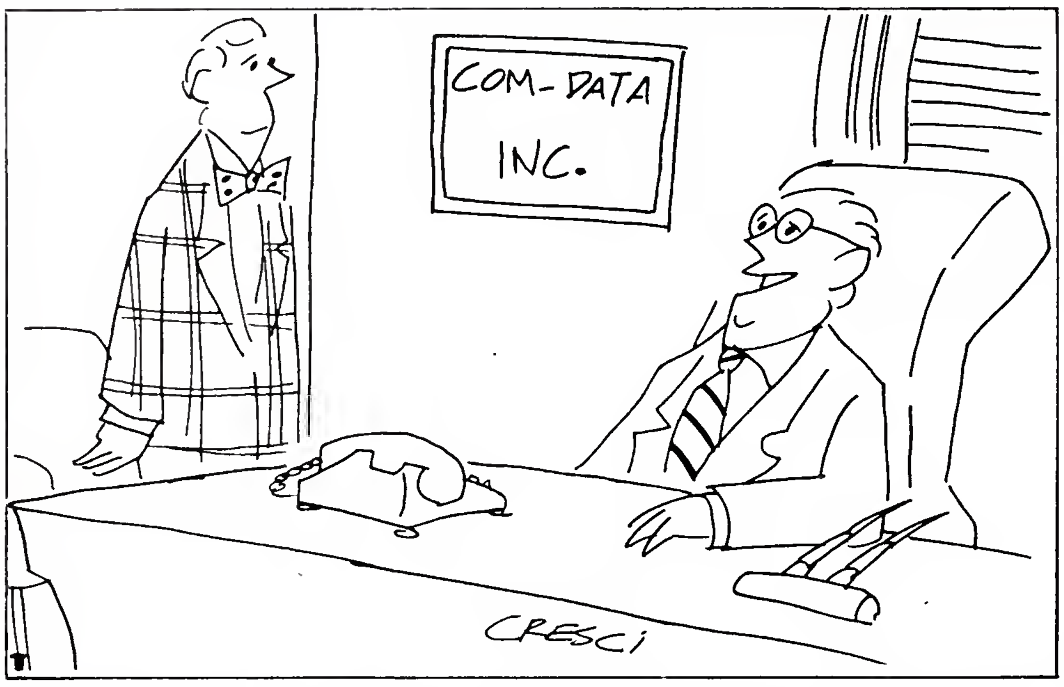


Figure 3: Directory-Driven Software (Integrated Data and Descriptions)



'I Got Where I Am Today Through 1% Perspiration and 99% Computers.'

Directory-Driven DBMS Seen 'Brains' of System

(Continued from SR/15)

the documentation about programs and data in the following way: who uses what, how they use it and perhaps why they use it.

In this sense, Weeks said, a data dictionary is like a hotel/motel guide that describes the characteristics of each establishment and makes recommendations on which to use on a particular occasion. By organizing and disseminating this information, the physical files can be correctly shared more often and the impact of changes recognized and managed more effectively.

Many companies have both the data structure road maps of DBMS and the data description guides of data dictionaries. Some have multiple data structures and multiple dictionaries with various software products. To answer a question or add a new application, one must sort through separate but overlapping sources of information that are often conflicting and incomplete, he continued.

With today's separate data dictionaries and data bases, each system has separately maintained data descriptions (See Figure 2 on SR/15). In many cases, each programmer manually codes data descriptions into each program. Furthermore, each application has logic to navigate the data structures and validate the data.

When a data structure changes to improve performance, or a field format or validity constraint is extended to accommodate a new application, everyone can be affected, Weeks said. Even those applications that could logically ignore the extended formats or varying performance characteristics are forced to make coding changes, which can ripple through existing application systems.

Program maintenance is increased, he said, and the backlog of new applications grows. The chore of assessing the impact of a new application is akin to planning a trip or business conference by using various maps, restaurant guides, motel brochures and tour books, Weeks continued. Once the route is chosen and the reservations made, one learns about a detour or a schedule change that invariably affects all of the logistical arrangements.

What is needed, according to Weeks, is a central, integrated directory that is used by all software components to control operations and enforce the installation security and integrity constraints (see Figure 3 on SR/15). With a high-level, directory-driven DBMS, programs or end-users can request data in a logical manner without navigating through the data structures.

It is similar to using a sophisticated travel service that has all of the necessary information at its fingertips, he said. The service can plan the trip or event to meet the stated requirements and the necessary constraints.

In the directory-driven system, the directory supplies information and controls the automated systems. A dictionary supplies information to humans for their control of nonautomated systems. Both functions are needed by the DP department and both can share much of the same underlying data descriptions, Weeks explained.

The important factor is not where the data dictionary leaves off and the directory takes over, but that the dictionary/directory information is shared by all humans and automated systems. The cost of building a dictionary is great and it can only be justified by heavy use, he said.

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MYTH #1

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FACT

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MYTH #2

80% of programming resources are taken up by maintenance work and there's no way to reduce this figure.

FACT

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MYTH #3

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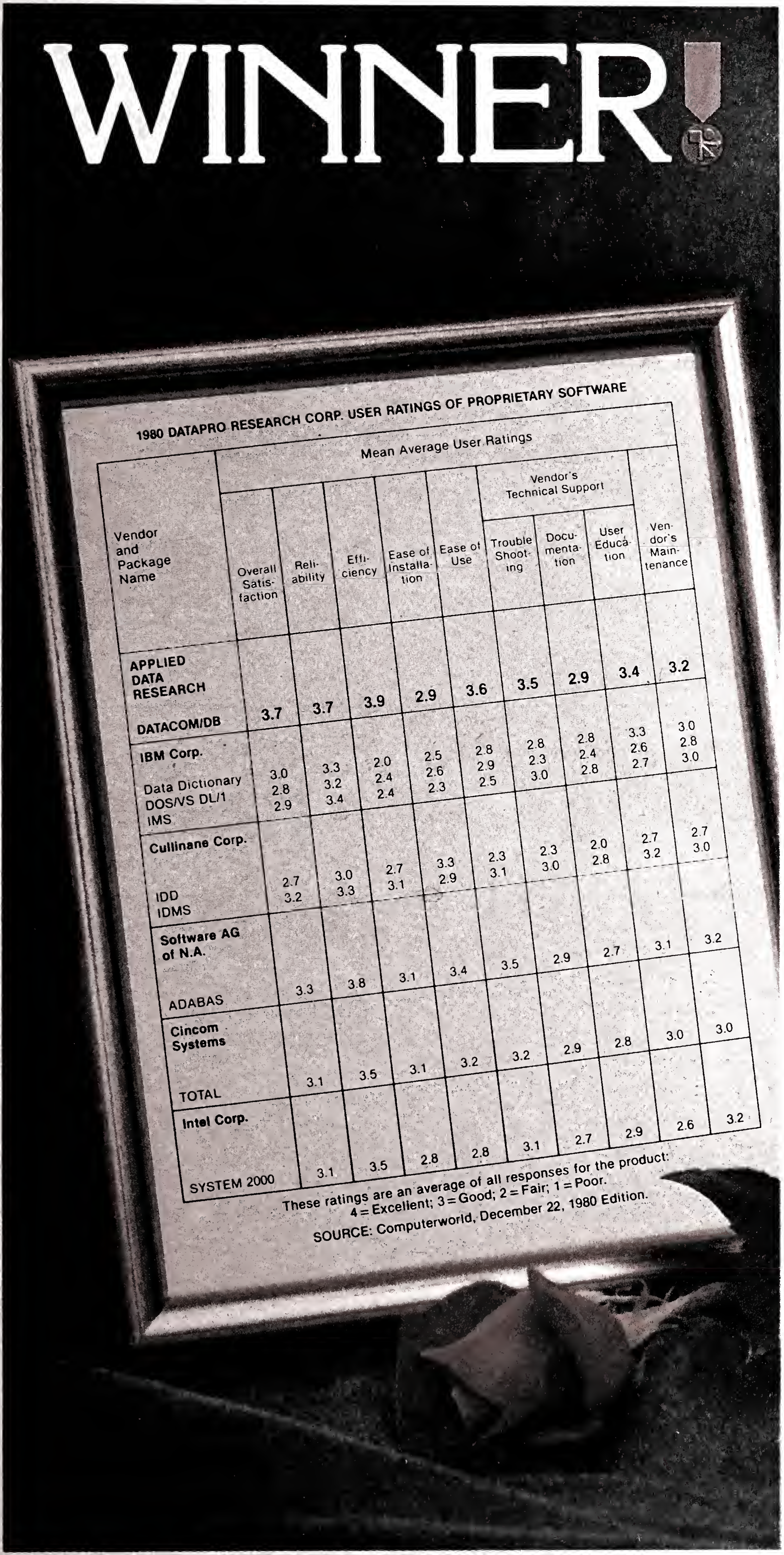

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APPLIED DATA RESEARCH **DATACOM/DB**	**3.7**	**3.7**	**3.9**	**2.9**	**3.6**	**3.5**	**2.9**	**3.4**	**3.2**
IBM Corp. Data Dictionary DOS/VS DL/1 IMS	3.0 2.8 2.9	3.3 3.2 3.4	2.0 2.4 2.4	2.5 2.6 2.3	2.8 2.9 2.5	2.8 2.3 3.0	2.8 2.4 2.8	3.3 2.6 2.7	3.0 2.8 3.0
Cullinane Corp. IDD IDMS	2.7 3.2	3.0 3.3	2.7 3.1	3.3 2.9	2.3 3.1	2.3 3.0	2.0 2.8	2.7 3.2	2.7 3.0
Software AG of N.A. ADABAS	3.3	3.8	3.1	3.4	3.5	2.9	2.7	3.1	3.2
Cincom Systems TOTAL	3.1	3.5	3.1	3.2	3.2	2.9	2.8	3.0	3.0
Intel Corp. SYSTEM 2000	3.1	3.5	2.8	2.8	3.1	2.7	2.9	2.6	3.2

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Relational Users Can Learn From IMS Mistakes

By Terence F. O'Neill
Special to CW

Although the relational data base model was developed over 10 years ago, it did not receive a great deal of attention from the DP community until recently. The change has come about because of the attention IBM has focused on relational data bases and because hardware and software developments are making relational implementations more practical.

There are a number of inherent advantages to a relational data base, and it would appear that eventually it will become a standard for the industry.

The purpose of this article is to offer an historical perspective to the implementation of relational data bases by comparing it with the implementation of IBM's IMS in the early 1970s.

Early IMS Costly

Many of the first IMS implementations in the early 1970s resulted in what could be termed "data base disasters." The biggest reason was cost — partly the cost to develop the software, but mostly the cost to run the new system.

Developing the new system was costly because of the data base related training involved and because of the mistakes made in using an unfamiliar tool. The training was costly both in terms of time and money. When key personnel left, it often took many months to train a replacement.

In addition, data base design was a new discipline and numerous mistakes were made. Often these mistakes were not recognized until additional application areas attempted to use the data base. The result was considerable rework and cost overruns.

More disastrous was the cost to process the new application. Very little was known about efficient design and tuning and the initial batch applications ran hours longer than expected. On-line transactions had response times that varied from long to intolerable.

In addition, IMS ran in expensive real core memory in those days rather than in virtual storage. Many installations were not prepared for the costs involved. In fact, it has taken 10 years of hardware development to make some IMS applications economically justifiable. The large Model 360s and early Model 370 were not powerful enough to handle IMS applications, which caused many hardware upgrades and ballooning DP budgets.

Relational Problems Similar

The same can be expected from early implementations of relational data bases unless proper precautions are taken. Relational data base implementations will not be practical for many applications without five to 10 years of hardware development. There is a substantial learning curve and some mistakes can be expected in the initial implementation.

Most importantly, the cost to process an application using a relational

(Continued on SR/22)

Relational Data Base Implementation

Below are the steps that Terence F. O'Neill recommends for a user's first implementation of a relational data base management system:

1. A thorough requirements study should be done to determine the business need. This should include a cost benefits analysis for the application and for use of the relational approach.
2. The first application should be small and relatively self-contained.
3. Data base design should be as complete as possible and include all of the systems that interface with the target applications.
4. A modeling effort should be undertaken to determine the expected performance of the system. This modeling effort should include enough volume to provide reliable projections of response time, throughput and storage requirements.
5. The functions of the vendor software that the application will use should be tested early in the project.
6. Do not overstate the benefits of the implementation. The user should understand that the benefits are real, but will be realized gradually over several years.
7. Plan the project thoroughly and realistically so that it may be delivered on time. Reasonable estimates for the initial installations can set back progress for years.

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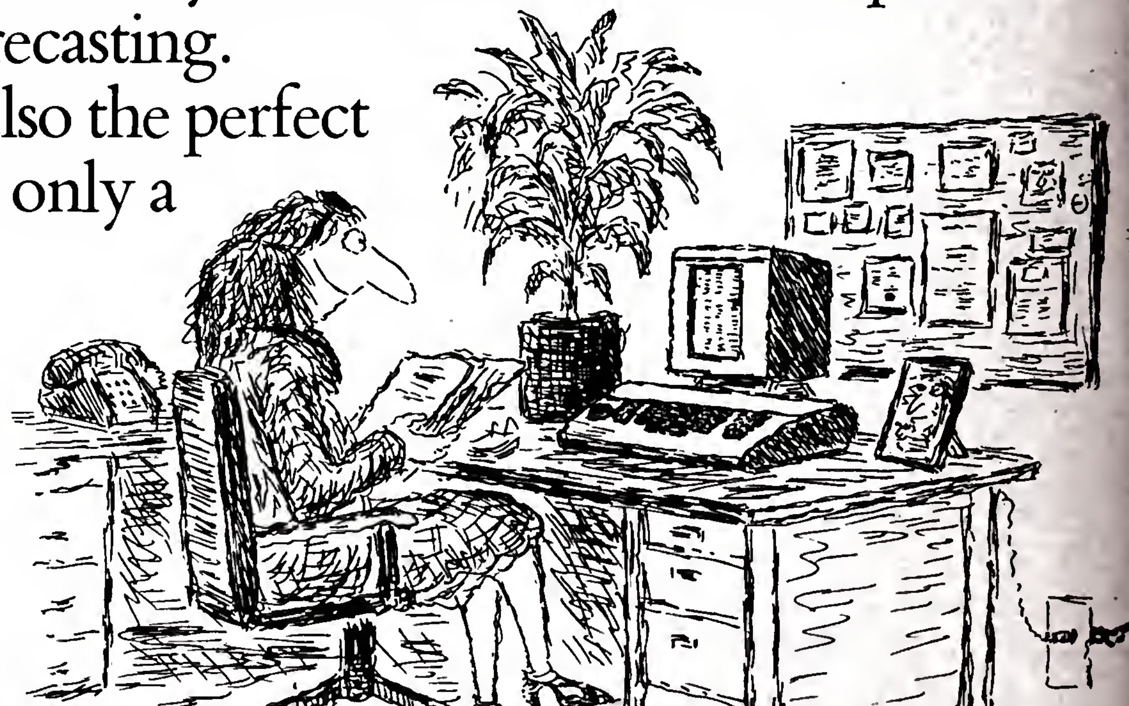

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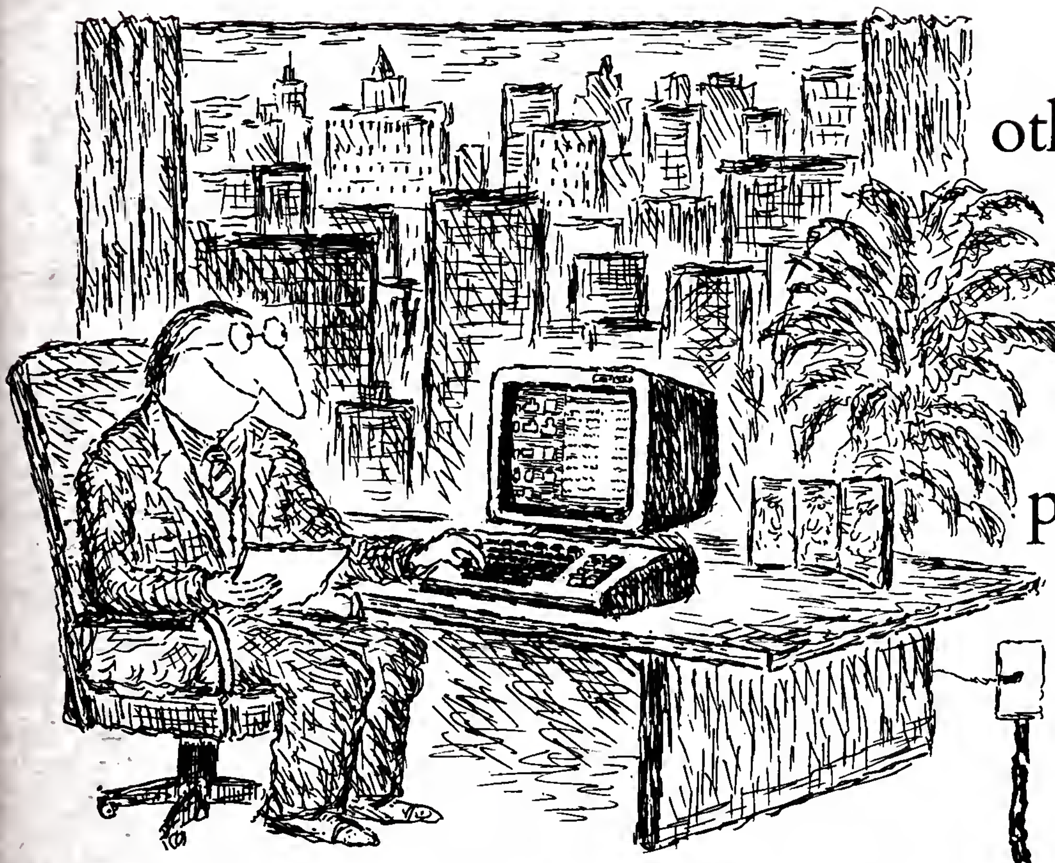

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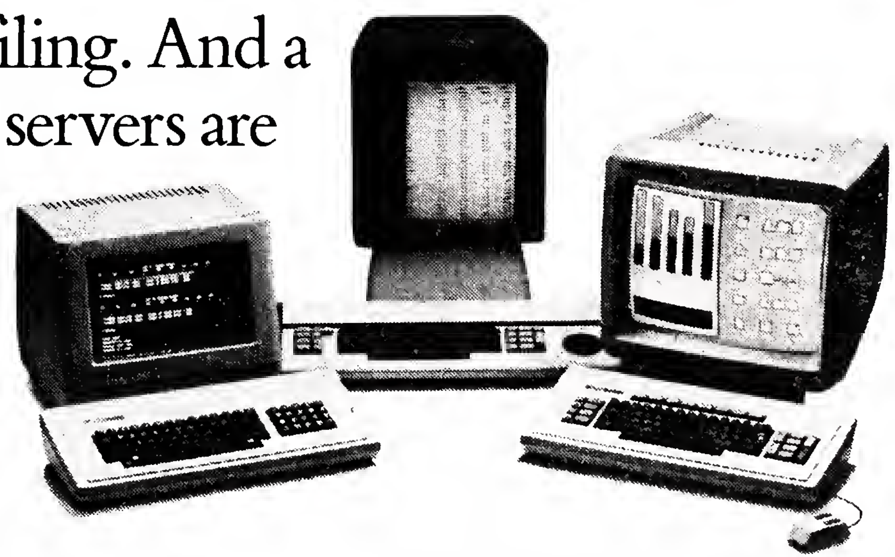

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Scholastic Magazines Reads the Competition

NEW YORK — Scholastic Magazines, Inc. grossed $126 million last year, practically a dime at a time, using a data base management system (DBMS) to handle an expansion effort as well as its current, enormous data base.

Scholastic is the 60-year-old publisher of elementary and secondary school magazines such as *Junior Scholastic* and *Senior Scholastic*, which students still can purchase for a thin dime.

To meet the demands brought on by the increasing competition for the educational market, declining school enrollments and tight school budgets, Scholastic has expanded internationally and has introduced new publications. It also stepped up cost/control measures in all its divisions. Nomad, a DBMS from National CSS,

Relational Users Can Learn From IMS Past

(Continued from SR/19)

data base may be many times the cost under a more conventional data base system.

The point is that relational implementations should be approached cautiously with models built and benchmarks run before investing in a large-scale application implementation. These were the key elements that led to the few successful IMS implementations in the early 1970s. Another factor leading to success was to design all of the application interfaces in advance of implementation so that redesign and rework were minimized.

Another area where serious mistakes were made in the early 1970s was user expectations. IMS was sold as being nonredundant while providing data integrity and shared data accessibility.

The interface systems that were required to interface the first IMS application to the surrounding batch systems often significantly reduced the advantages of using a data base system.

The early users saw a limited system that did not achieve the benefits promised, was costly to develop and more costly to process than the system it replaced.

A close parallel can be expected when implementing the first application under a relational data base model. This data would have to be coordinated with data not available to the relational data base manager. This could severely limit the benefit of using the relational approach because the "ad hoc" inquiry capability would not be supported by the interfaces.

The interfaces could require that data stored in a relational format would need to be extracted for use in existing applications and the extract process would be expensive.

In addition, relational is being sold as a way of providing the capability to do user-friendly, "ad hoc" inquiries and reports. While the relational data base fully supports these features, the inquiries may be too expensive to process on-line.

If an installation is to implement a relational data base, it is very important that the first steps do not falter. In these early days of relational software, this task is very difficult because the hardware does not fully support the relational approach and the software is not bug-free.

O'Neill is a consultant with Applied Information Development, Inc. in Oak Brook, Ill.

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by Using DBMS to Keep Track of Market Shares

Inc., is utilized to handle the publishing company's expansion effort as well as its current, enormous data base.

Critical to new product/market development and cost control are more efficient market analysis and more highly targeted sales efforts, Vice- President of Research Richard Cryer emphasized. Scholastic has 100 sales representatives, but its major method for reaching the schools' markets is direct mail; more than 50 million pieces are sent out each year.

Scholastic has developed massive computerized files on its product sales and on the nation's schools. "For a long time we had the only complete school file in the country, and it is still the best," Cryer said.

"We have been trying for years to devise a quantitative method of segmenting the whole school system universe into homogeneous market segments — so that we could analyze sales by these groupings," he explained. After spending two years on the problem personally, Cryer now has his method and a system that is operational.

District Cluster System

Working with Claritas, Inc., a Washington, D.C., market research firm, Cryer devised a school district "cluster" system. With the assistance of National CSS of Stamford, Conn., he has been able to summarize the millions of items of information on schools and products into a data base organized by these clusters.

Nomad is the facility through which on-line Scholastic can generate dozens of different reports that answer the "why" questions of sales, he noted.

Scholastic's data base contains census data providing demographic information about millions of U.S. households; Educational Testing Service test score/IQ data; data from the National Center for Educational Statistics, the Office of Civil Rights, the National Institute of Education and the National Institute for Student Opinion; and finally, Scholastic's own product and customer files on schools, teachers and other groups.

'Clustering' Technique

Information from these data bases was analyzed through a mathematical "clustering" technique to group the nation's 16,000 school districts into 40 clusters, he noted.

There are reports showing rankings by district size; reports showing the number and percent of districts, schools, teachers and students in each cluster; and reports showing the percent of a cluster's districts located in each census region.

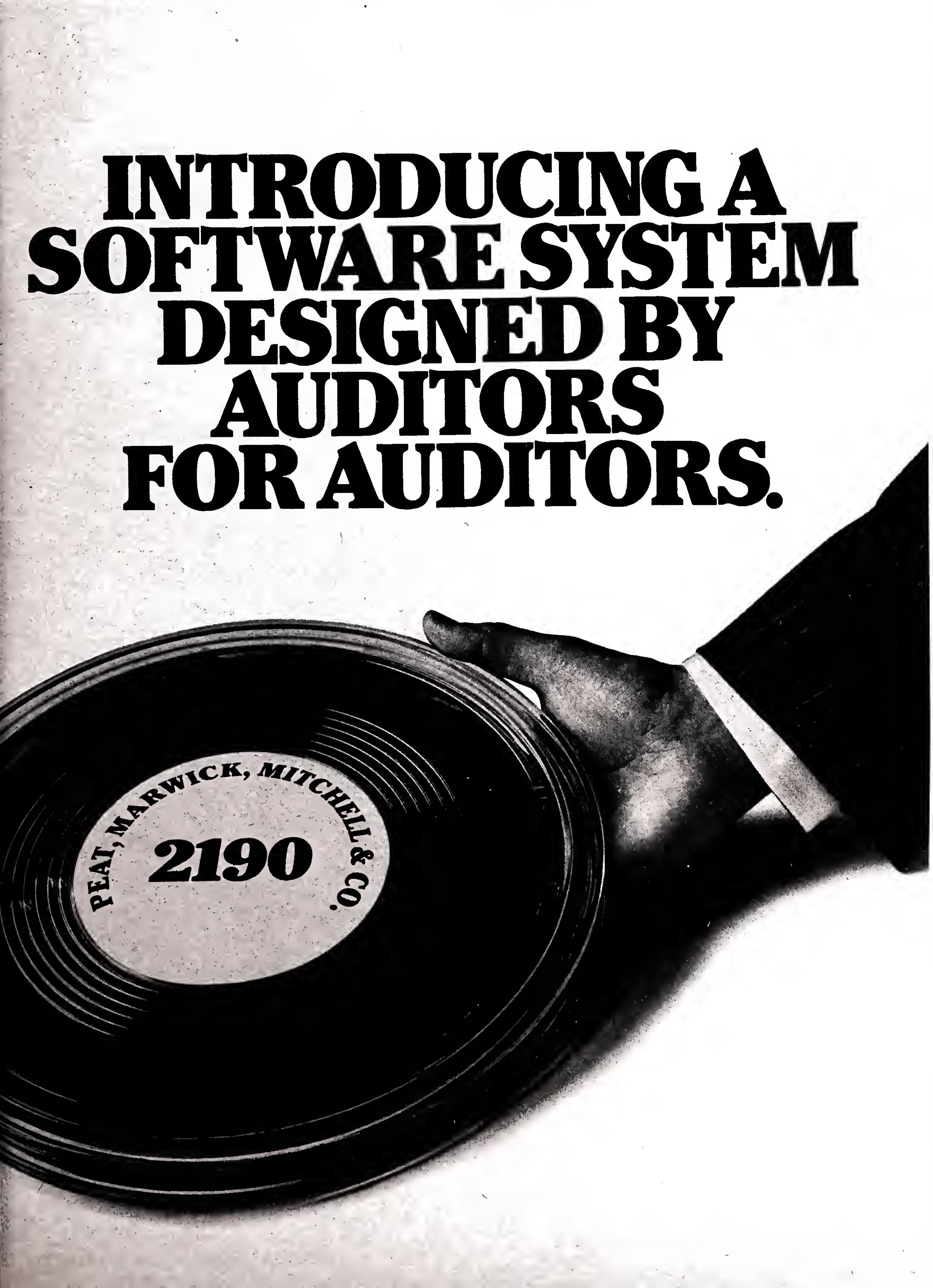
Using Nomad, "we can come up with hundreds of sales penetration indexes by cluster — [such as] sales per teacher, copies per students, books per order — and select the richest one, the one that indicates the most about a product," Cryer said.

When one backtracks through the clusters and those indexes represent, patterns begin to emerge. The nation's schools and students, their abilities, weaknesses and needs take on definition, he explained.

The next major step is companywide application of this system to market analysis and development and to sales programs.

Cryer's main mission over the next several months will be to help define the use of this data base system for each Scholastic division and to educate these "end users" in its potential.

"It is a difficult system to explain but an easy one to demonstrate. That is why I believe it won't be long before Scholastic will be seeing tangible benefits from it," Cryber said.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Relational Tools: Response Times Getting Better

By David Ferris
Special to CW

Comparisons of relational data base management systems (DBMS) with conventional systems are now beginning to surface, and they appear to confirm that mature relational products have similar performance characteristics (see related story on Special Report/27).

Not surprisingly, some relational DBMS offer better performance than others, particularly the more mature commercial products, which tend to have better tuning mechanisms.

Often, studies show relational systems being slower than conventional ones, and, in general, the average mature nonrelational DBMS is likely to be faster than the average relational one.

However, more and more users are finding that the mature commercial relational DBMS achieve speeds comparable to nonrelational systems, as in the following evaluations of Relational Software, Inc.'s Oracle product:

Companies Compare

— GTE Sylvania compared Oracle with Adabas/M, a Digital Equipment Corp. PDP-11 version of Software AG's inverted DBMS for IBM mainframes and found that, for their applications, the relational DBMS was somewhat faster.

— The National Aeronautics and Space Administration compared the relational DBMS with Seed, a Codasyl DBMS developed by International Data Base Systems, Inc., and came up with the interesting result that while for small- and medium-size data bases the Codasyl system was faster, the relational system gave better response time for large data bases (more than 600,000 records per table).

— ITT found the relational system "comparing favorably" to Adabas/M.

Clearly, individual benchmarks almost always reflect the particular applications of the testing organizations and so cannot be arbitrarily applied to other environments.

But it is equally clear that, in a wide variety of cases, the response-time cost of using relational DBMS is not very significant, provided the system has suitable tuning facilities.

So it looks as if time is on the relational side. It is undoubtedly true that the arrival of associative high-speed memory will allow users to give more powerful commands than they can at present and will generally speed up relational DBMS as well as nonrelational DBMS.

At the same time, it appears that contrary to established opinion, the viability of relational systems does not depend on this. The evidence is mounting that a relational DBMS is capable of normal response times using existing tuning technology.

Ferris is a software consultant based in San Francisco and London. He holds a master's degree in computer science from Stanford University.

Relational DBMS Performance? Not to Worry

By David Ferris
Special to CW

It is increasingly accepted that relational data base management systems (DBMS) offer higher levels of programmer productivity than conventional network and hierarchical DBMS. But people are often afraid that relational DBMS gives unacceptably slow response times, especially for large data bases.

The presence of commercial relational systems is beginning to be felt and experience suggests such fears are exaggerated.

The primary characteristic of a relational DBMS is that it presents all data to the user as if it were stored in a series of independent two-dimensional tables.

Also, by means of what are called "joins" and "views," multiple tables can be made to appear as if they are a single table. This results in extremely high degrees of data independence and lowers software maintenance efforts and costs considerably.

This tabular representation is both the strength and weakness of the relational DBMS. The uniformity of the representation makes it very easy for the user to define, manipulate and query data tables. So, roughly put, programming time is greatly reduced.

On the other hand, the problem with representing all data as two-dimensional tables is that, while this may be a wonderful way for people to think about their data, it is a rather poor way for computers to store data so far as performance is concerned.

Proposed Solution

The solution to the relational DBMS problem is said to be found with large associative memories, content-addressable disk storage and other hardware innovations that will be introduced later on in this decade.

Only then, it is claimed, will relational systems be able to do everything conventional DBMS does with acceptable response speeds. Until that time, relational DBMS will be used only in applications where performance is not a critical issue.

Aside from this reasoning, many people are afraid of relational DBMS because they have heard reports of individual implementations having poor performance.

Early systems, especially ones developed in universities, were often weak in this regard. However, a number of implementations have been measured as having much faster response times and it should not be thought that the early inefficient relational DBMS necessarily characterize the field.

Relational Technology

Today, practical experience with relational DBMS is quickly accumulating, although clearly they have not yet achieved widespread usage.

The results so far seem to indicate that there is nothing intrinsic to relational technology to make it substantially different in run-time speed from conventional DBMS.

The reasons for this are two-fold: the ability to tune relational DBMS has been underestimated and benchmarks are appearing that compare relational DBMS favorably with conventional DBMS.

Regarding tuning, it appears that relational DBMS can be tuned in much the same way, and with the same tools, as nonrelational systems.

For example, rows in a relational table may be physically close to rows of another table. The rows may contain pointers to each other or may be referenced by indices or hashing.

These are exactly the same techniques as those used to tune network, hierarchical and inverted DBMS. The only difference in terms of tuning is that the user of a relational system, as opposed to the data base administrator (DBA), is shielded from much of the tuning apparatus.

In fact, a relational DBMS offers the DBA considerably more tuning flexibility. Because the user — whether programmer or end user — is isolated from most of the tuning, software built around the data base is not closely bound to the tuning.

Record-pointer relationships, or physical hierarchies, for example, can be changed after the fact to meet corporate needs without requiring software rewrites. Similarly, new indices can be added to improve performance without reworking existing programs.

As with nonrelational systems, the DBA's tuning task is a skilled one, of crucial importance to performance. Currently, due to the newness of most relational products, the tuning facilities tend to be less developed than those of conventional DBMS.

Nevertheless, some relational systems do already have a good set of optimizing tools in place and time will see further major improvements.

Ferris is a software consultant based in San Francisco and London. He holds a master's degree in computer science from Stanford University.

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CW 1130

A Look at Relational vs. Conventional DBMS

By **Eugene Wong**
Special to CW

Differences between relational and more conventional data base management systems (DBMS) are perhaps best examined by analyzing how the system affects its end user. One basic area of distinction is how the system's data is perceived by that user.

A relational data base is perceived by the user as a collection of rectangular tables. Each table is called a relation, hence the name "relational." No data structure of any other type exists in the description seen by the user.

Aside from its aesthetic value, simplicity of description has many practical advantages. It makes a data base easy to learn for new users. It allows the data dictionary to be homogeneous and compact.

Subtle Advantage

Its greatest advantage, however, is a subtle one. The fact that only a single data structure exists is responsible for the high-level data manipulation and control that relational systems enjoy.

Most nonrelational systems include "tables" as one of the structures that can be used to describe data. Could not any one of them be turned into a relational system by merely limiting data description to "tables?"

However, mere relations do not a relational system make. It is a common mistake to consider the user interface of a system as consisting only of data structures.

Data Manipulation

Data manipulation in a relational system is both relation-at-a-time and nonprocedural.

With a single statement that specifies what, and not how, one can retrieve an entire collection of records and in the process make the collection a new relation that can be operated on again.

In contrast, the data manipulation language in nonrelational systems is procedural. In order to retrieve a single record, an application programmer must find an access path to the desired record and then traverse the path step-by-step to reach it.

Every step requires not only an explicit statement to describe it, but also a control statement to handle exception conditions. And the whole process must be repeated if multiple records are to be retrieved.

Truly Relational System

Some technical specialists maintain that a truly relational system must physically relate each piece of data to every other data element. They correctly point out that the memory technology needed to make this work is not yet commercially feasible.

On the contrary, relational systems are meant to free users from any dependence on storage structures or physical devices.

A relational system should be designed to support a diverse and possibly changing collection of underlying storage structures. This insulation of the logical objects that application programs reference from any implementation-related aspect of the system is referred to as data independence. It is a primary objective in modern data base management.

Data independence promotes program longevity by allowing applications programs to survive changes in the way data is physically stored. It also promotes adaptability by allowing physical structures to change without affecting the viability of existing programs. Lack of data independence means early obsolescence for application programs or stagnation in storage structures.

Wong is vice-president of Relational Technology, Inc. in Berkeley, Calif.

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For New England Retailer, DBMS Not Answer

BOSTON — The challenge facing DP executives at Filene's department store, a well-known landmark to New England shoppers, was finding better ways to give management-level people necessary information in the format they need. The solution turned out not to be a full-blown data base management system.

"In retailing, obtaining information on an ad hoc basis is a necessary way of life," according to John J. O'Leary, vice-president of management information research and strategic planning. "Waiting for reports is simply not acceptable for most retailing managers. In volatile situations, the ability to make critical decisions requires up-to-the-minute information.

"We knew that an on-line query system would meet our needs, and we investigated QBE [IBM's Query by Example], as well as several others at National Retail Merchants Association conferences and shows," O'Leary said.

Thomas J. Burns, director of systems development, added, "In 1981, Filene's converted from an IBM 370/145 with a 512K-byte capacity to a 4341 with 4M bytes [capacity], running VM/CMS, OS/VS-1 and DOS/VSE. Since we're in an on-line environment," he said, "we wanted to take full advantage of inquiry/response techniques."

The retailer decided on Artificial Intelligence Corp.'s Intellect, an online software query system that allows users to interact with computers by using everyday, conversational English. Burns said that "between October 1981 and the end of June 1982, we're planning to implement six major on-line systems. In the meantime, Intellect is giving us experience in handling a true, user-friendly system in an on-line environment."

"We're initially using Intellect in personnel," O'Leary said, "because manpower is one of the vital ingredients to successful retailing and personnel was the perfect application for exposure to what Intellect could do for us.

"Now that Intellect's multifile capability is available, we are adding a second application involving merchandising data in November of this year and a third application in the financial area in February of '82," O'Leary continued.

Intellect's Capabilities

He cited the capability of the Intellect system to respond to complex questions. "If personnel wanted to know how many department managers at Filene's were in their current jobs more than two years and less than four years, and who earned more than $12,000, but less than $15,000, and were female, it would be no problem with Intellect. Intellect gives us the capability to get immediate answers to complex questions such as this, phrased any way we like. For example, the way I just phrased it."

Nicholas Stephens, director of personnel services, added that "Intellect lets us do in 20 seconds what previously needed a day or so to complete.

"For example, when a Filene's employee retires, there are many forms to be completed. Before Intellect, we had to first, requisition the employee file, and second, transmit to data processing. Data processing had to, three, enter the data, four, schedule the job for processing and five, process and send the job via interoffice mail back to us. As you can imagine, it could be days before we got what we needed," he said.

"Generally, the old system required at least a day to close out a retiring employee's file properly," he continued. "Using Intellect, now all we do is query the system giving the employee's name/ID number. We examine the entire file on the CRT, instantly update and get a complete printout. This is all done in a few seconds."

O'Leary said, "Now that we're using Intellect on a daily basis, we are finding things to do automatically we never would have considered before. Many manual systems are going to be automated because Intellect has shown us how easy it is to do."

The Intellect package at Filene's is using a lexicon that was created to define the data as it is seen by a Filene's manager, who may have knowledge about retailing, but no DP background, he added. This enables Intellect to understand the questions asked about the data by the user, regardless of how it is phrased and to provide the answers.

The first lexicon was built for the personnel function, O'Leary ex-

(Continued on SR/32)

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DBMS Contributes to Facilities Management

ZEELAND, Mich. — Today, more and more corporations are realizing the value of having well-managed facilities that keep pace with change and contribute to the efficiency of their operations. Looking for ways to accomplish this goal, many begin with manual systems that are laborious and cumbersome or address only an isolated part of facility management.

Herman Miller, Inc., here decided to use a data base management system (DBMS) as the basis for its own Facility Operations Support System, which it provides for its clients. The company selected Seed, a DBMS from International Data Base Systems, Inc.

Herman Miller's basic business approach goes beyond selling products to providing customers with a well-functioning working environment, according to Jeff Cross, program manager of marketing. "We believe our products help achieve this result, but that it also takes software, services and information."

This system, then, is a software tool which is designed "to help our customers control and manage their facilities." Using the system, purchases can be controlled, inventories can be managed (see Figure 1) and future facility needs can be projected, he added.

Seed is applicable for specifying equipment; such as furniture, machines and accesories; tracking pro-

(Continued on SR/32)

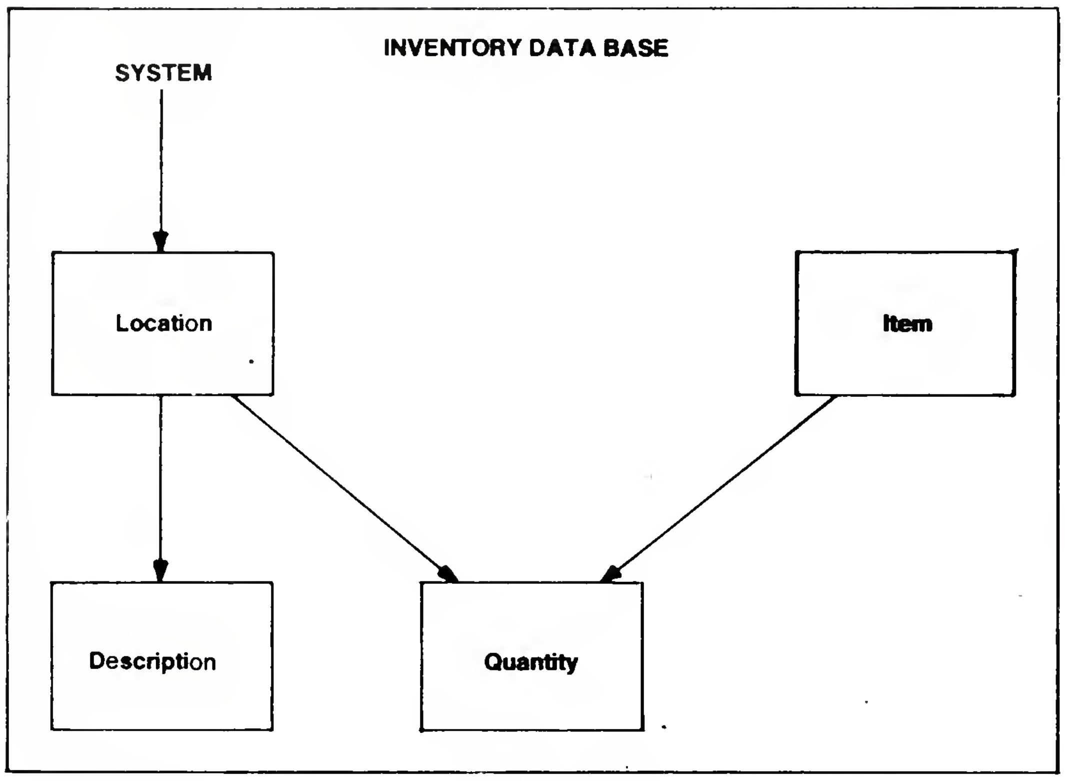

Figure 1

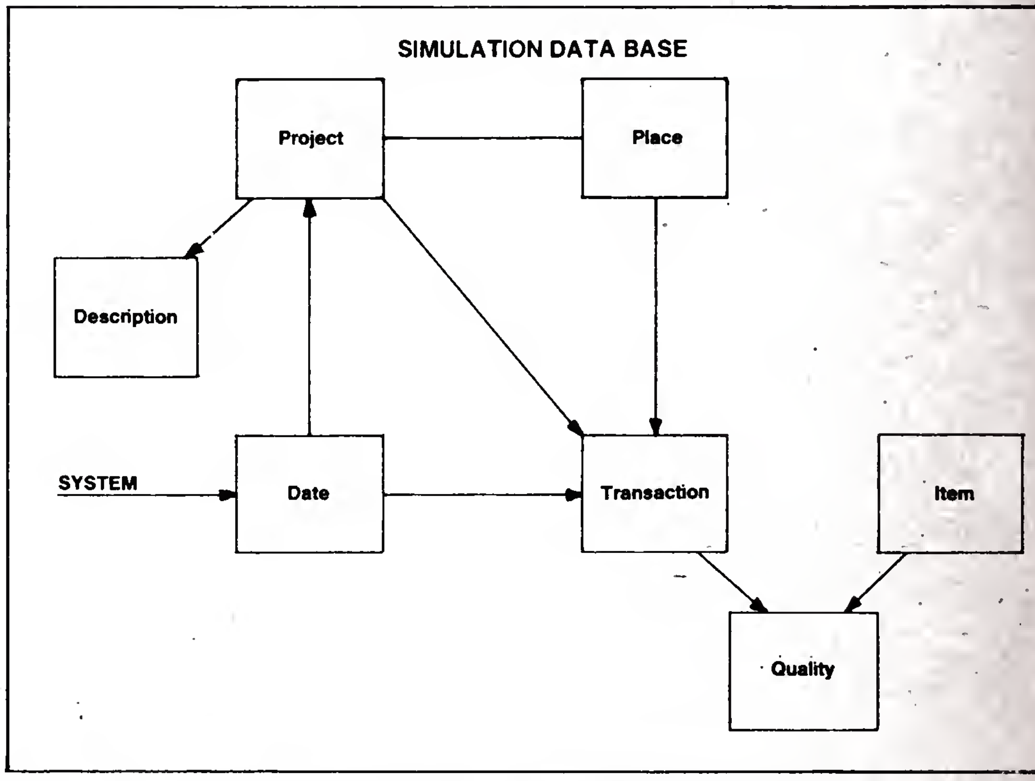

Figure 2

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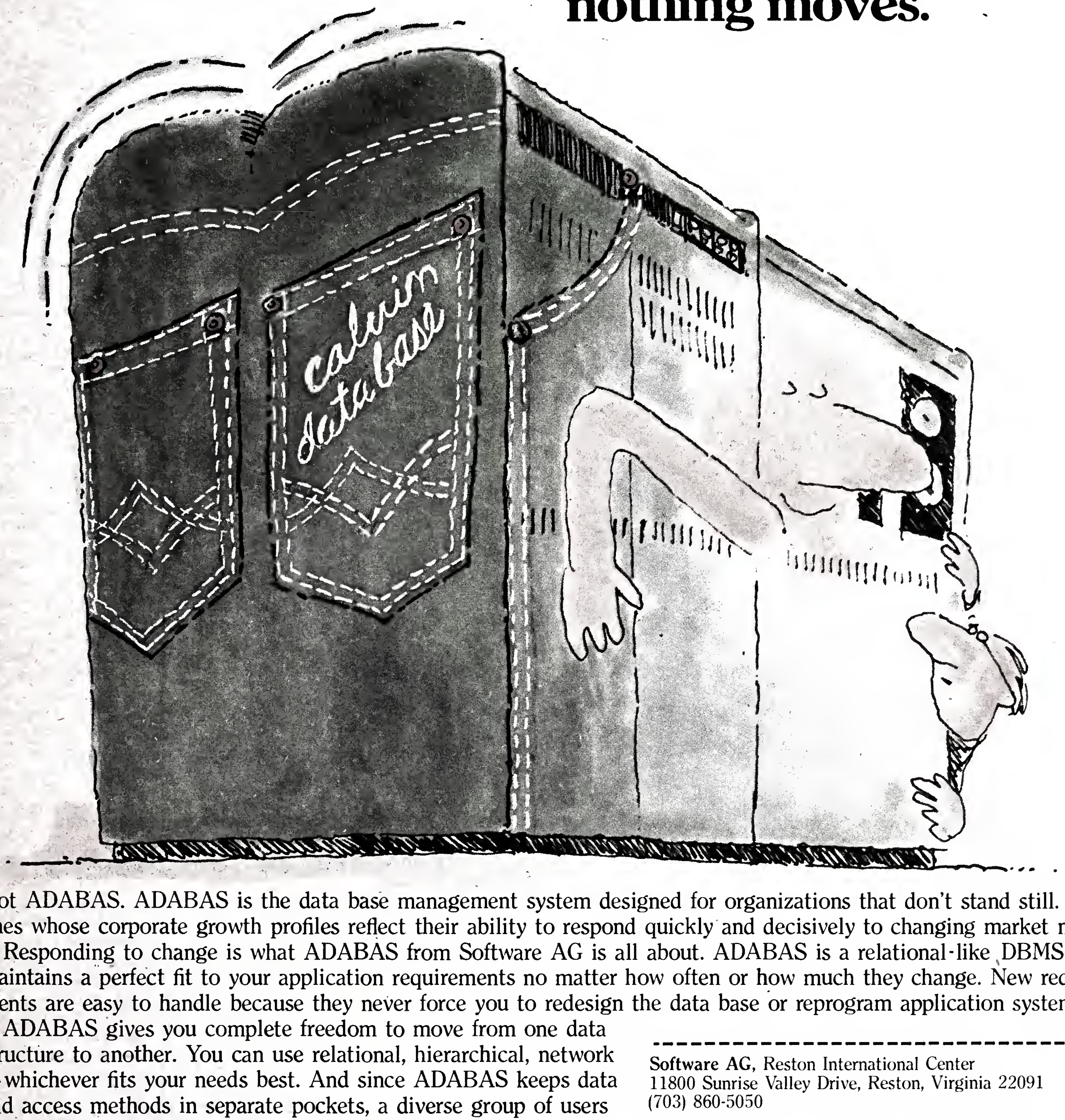

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DBMS Helps Clients Control, Manage Facilities

(Continued from SR/30)

jects, such as department changes, facility expansions and major moves; and managing inventory.

The Facility Operations Support System has also been adapted to some unique applications within Herman Miller. For example, its service center uses the system to manage inventories of returned furniture, spare parts and sales literature, Cross said.

The data structure of the Seed system allows the user to define items, locations and quantities and to track them over time, he explained. The Seed program is used to manage the data within this structure (Figure 2 on SR/30).

Herman Miller has benefited from the application of Seed to its environment in various ways, according to Cross. First, the system demonstrates the company's interest in providing results rather than just selling products, which helps strengthen its position in the marketplace.

Secondly, it provides a source of revenue realized through time-sharing service or software licensing agreements, Cross continued.

Last, the system has improved the efficiency of a number of internal user groups which, in turn, improves the efficiency of Herman Miller, he said.

The company feels that effective facility management is an on-going process, and that its Facility Operations Support System (with its origins in the Seed DBMS) affords this effective management as well as efficient processes.

"Using this system, our customers realize greater value from their present facilities, keep additional purchases to their effective minimums and more quickly and accurately plan new facilities to rearrange existing ones — all within their budget requirements and timetables," Cross said.

Store Uses Its 'Intellect'

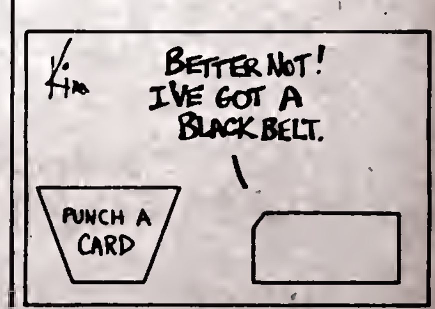
(Continued from SR/29)

plained. Additional applications will allow Filene's to use the system for analysis of merchandising and financial data and each will have its own lexicon, he added.

"Now anyone in the personnel department, or anyone who is authorized, can ask the system all kinds of questions and get immediate answers. The same question can be asked many different ways, but Intellect understands and comes up with the correct response," he said.

"Our manpower situation is not vastly different from other large retailers," Stephens said. "But the nature of personnel information in this type of work environment creates the need for many one-time-only reports. The data processing department did the best they could to provide us with information we needed. But it was a time-consuming, inefficient and ultimately costly procedure. Now we can get into the files, get the information we need and not impact the data processing department," he explained.

Intellect has made life much simpler for the personnel people, according to Nancy Bowen, head clerk of personnel records. Surrounded by tiers of file cabinets crammed with employee data, she commented, "We never knew a system this easy to use could be so helpful."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'Simple Yet Significant Innovation'

Local View 'Revolutionizing' Data Base Design

By Ronald G. Ross
Special to CW

There is a revolution occurring right in front of our very eyes in data base design practice. This revolution is based on a simple, yet significant, innovation called the "local view" or the "user view" of data.

Unfortunately, some design teams have recently become so taken with the new technique that they are forgetting a fundamental law in computer systems — that the essence of good design practice is balance.

First, what is the excitement all about? For many years — all through the 1970's, in fact — data base experts have been looking for design techniques that equal the breakthrough in raw technical capability that data base management systems (DBMS) have presented.

That raw technical capability has to do with flexibility — a DBMS can be used for virtually any data structure that the designer might want.

But how is a good design to be found? Because DBMS are so flexible, data base gurus have been urging designers to postpone the design task until all of the end-users' requirements have been first defined. In this way, they say, the pitfall of making design assumptions based on physical biases can be avoided.

The problem is that they have failed to specify just how this worthwhile goal might be achieved by those actually manning the trenches. Without such guidance, many designers have fallen back into the old habits they had before data base systems came along. These usually consisted of designing data base structures on an as-you-go basis.

Needless to say, the power of DBMS — to say nothing of end-user requirements — was sacrificed in the process.

Local View Approach

Within the last year or two, however, all this has changed with the perfection of the local view concept. The local view approach allows the designer to define end-user requirements as the end user sees them, without any bias toward a particular structure.

Yet the local view carries structural information in it. The reason that theconcept works is because designers have confidence that once the requirements definition phase is complete, they can convert the structural information in all the local views into an integrated logical data base architecture.

In some cases, this conversion process has even been automated. Synergetics Corp.'s recent announcement of a relational generator in its Facets data base design and documentation tool is one example.

What exactly is a local view? A local view of data is simply a collection of data elements needed by a user to perform a particular task in his business activity.

This collection is organized with the data elements gathered into groups and the relationships between these groups expressed.

A local view is really just a data structure that is different from a data base structure because it represents an actual use of the data.

For example, a local view might be defined for a particular report that a user needs. Or a local view might be defined for the most logical structure of input data to a program or to a step in a procedure. In each case, each local view assumes no overall design, but concentrates only on logically expressing the local use of data.

The excitement over local views comes about for several reasons. First, local views are inherently user-friendly. They are relatively simple to understand and even end users learn fairly quickly how to deal with them. This is a big plus in correcting the communication gap between DP and end users.

Bridges the Gap

It is also relatively easy to convert local views into an integrated data base structure. This bridges the gap between requirements definition and logical data base design.

Unfortunately, some data base designers have taken to the local view concept so strongly that they have lost sight of the critical need for balance in data base design.

Consider, for example the basic question: "Where do local views come from?" The answer is usually that they are developed through discussions with end users.

If that sounds simplistic, it is. Without some context for understanding the business and its activities — a business data model, for example —

(Continued on SR/34)

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Builder Installs On-Line, Multisite DBMS, Remedies Payroll Reporting Headaches

MINNEAPOLIS — Does the prospect of developing an on-line, daily payroll reporting system for multiple sites cause migraines within your DP department? This was one of the problems faced by S.J. Groves and Sons Co., one of the largest privately held construction firms in the country.

Either directly or through subsidiaries, Groves is also involved with tunnels, dams, power plants, airport runways, real estate, metals, coal mines and other related enterprises as far away as Saudi Arabia.

In 1979, Groves was using IBM's DL/1 data base management system (DBMS) and DMS, the vendor's on-line application development system. The company was running the software on an IBM 370/138 with 1M byte of memory under DOS/VS, using the CICS teleprocessing monitor. There are plans to switch to an IBM 4341 under VM/DOS/VSE.

A Critical Application

The critical application Groves needed to develop was an on-line, remote site, daily payroll reporting system for major construction sites in Atlanta, Chicago, St. Paul, Minn., and Bonneville, Wash.

The payroll application, among other things, records hours worked, workers' addresses, job titles, job status and cost distribution for all four sites. What makes it complicated, a spokesman explained, is that one employee may work against as many as five pay scales in a single day, each of which has to be distributed on-line to the appropriate cost accounts.

In December 1980, Groves switched to Cullinane Database Systems, Inc.'s Integrated Data Management System (IDMS) after an evaluation that included "presentations from some of the top DBMS vendors in the field," systems support supervisor Cyril Soukup said.

Original Intention

Groves' original intention was to develop more applications with DL/1, but, according to Soukup, "Its logic was difficult. Nobody was taking the time to learn anything about it; it just sort of sat there."

Management had to determine whether to make a firm commitment to DL/1 or to switch systems. Since they had installed their system originally on a trial basis, without any formal study or presentation, they decided to attack the problem as if they had no DBMS at all.

Five members of the management information systems (MIS) department spent three months in a preliminary study that showed IDMS; Cincom Systems, Inc.'s Total; and DL/1 to be the most appropriate DBMS for their size and need.

Focus on Flexibility

Groves' major requirement was flexibility. "We found a certain rigidity with DL/1," systems and programming manager Carol Stotts said. "When new requirements came up, it was very difficult to work them into the previous designs."

Security was another vital area and control, through a data dictionary, was a third requirement.

Groves felt IDMS won out in terms of flexibility. Soukup explained that during each sales presentation, his evaluation team gave the vendor representative a difficult hypothetical payroll problem to solve, which IDMS did "with ease."

IDMS met the security requirements with its subschema concept that gives each user the precise data base view he requires. Soukup added that IDMS automatically takes care of crashes and backups — a feature that was not written into DL/1 —and CPU utilization dropped from nearly 95% to 80% to 85% with IDMS, he noted.

Local View Revolutionizing Data Design

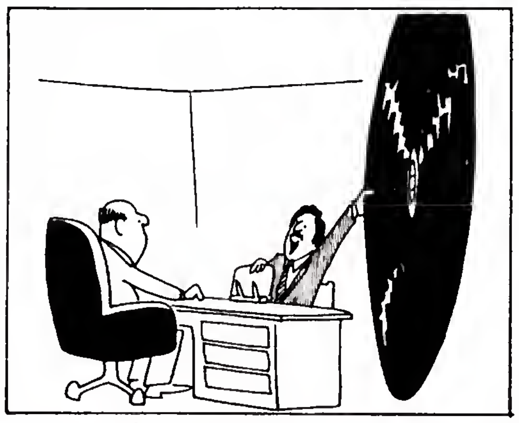
(Continued from SR/33)

the data base team will very quickly lose its way. Here, then, is one area where balance is vitally important.

Another area where balance is needed is the following. Although it is relatively easy to convert local views into a logical data base structure, this is not a structure that one should necessarily implement directly on the computer with the given DBMS.

Computers still have limited resources; in spite of the excitement over local views and relational structures, nothing has yet changed that fact. This suggests one must seek a performance balance in logical data base design. There are many factors that must be weighed before a final structure is chosen — local views per se are just one of the many "inputs" to the design process.

Ross, based in Houston, is editor of the Data Base Newsletter, *published by Performance Development Corp. in Princeton, N.J.*



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In Building Data Model
Business Users' Involvement Urged

WALTHAM, Mass. — The key to building an effective information center is to actively involve users and managers with business knowledge of the data resource in its analysis and design, according to Robert Rollason, a vice-president with Information Methods (USA) Corp. here.

However, he said this user involvement has only been passive to date. The business knowledge, more than the DP knowledge, is the determinant of success, Rollason said. It can be harnessed directly and, if used effectively, can provide a model of the data resource that mirrors the organization from a business viewpoint, he added.

To build this data model requires a consideration of present data and processing requirements, as well as an examination of possible future business directions, he continued.

There is an urgent need for techniques such as "information analysis" followed by "procedure formation," major components of the information engineering methodologies, Rollason said.

Information Analysis

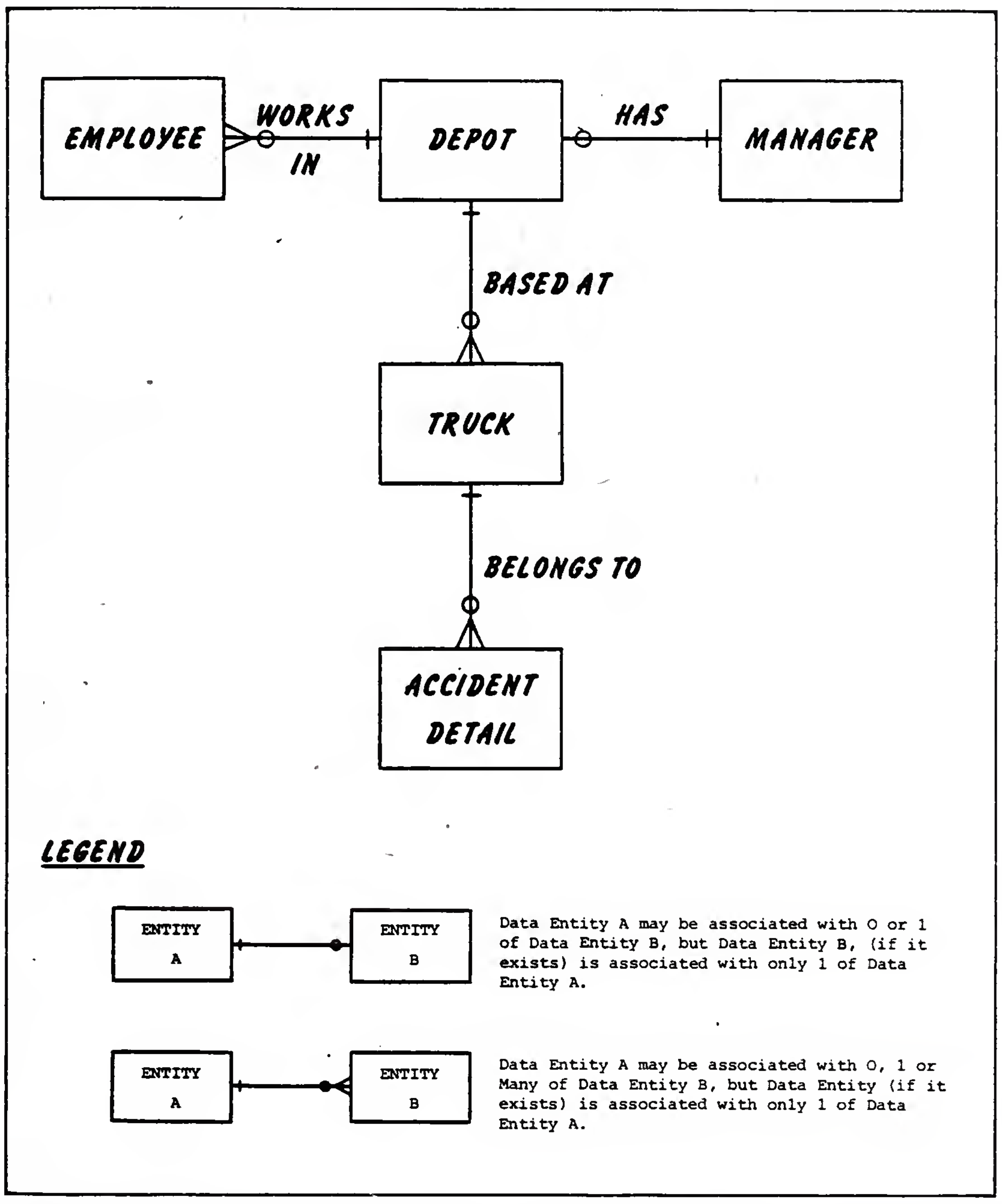
The role of information analysis is to provide a formal set of simple business-oriented steps, which allow businessmen to define and model the data that should be available in the files or data bases provided by their information center, he explained. The technique allows management to interpret the goals of their business in data terms and subsequently in procedural terms via procedure formation.

To allow easy implementation of this data model later by DP, it is first developed by the users at a logical level, Rollason continued. This considers the information that should be available for effective decision making and management of the business.

The data model indicates data entities that should be stored for later reference to provide the necessary business information views. Relationships, which exist between these data entities, show how the data is associated from the business viewpoint. An example of such a data model is shown on this page.

Through implementation analysis, this data model is developed and cross-checked to ensure that it will support the objectives of the business. In fact, information analysis is a technique that translates management's interpretation of business objectives, he said.

Subsequent cross-checks are used to transform this data into a stabilized form. The normalized data model can be easily implemented for information center access in a relational data base or may instead be implemented using traditional data base management systems (DBMS) for later migration to relational data base. This is achieved by maintaining the logical data model, as well as any physical implementation from it, in a data dictionary, he said.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Data Entity A may be associated with 0 or 1 of Data Entity B, but Data Entity B, (if it exists) is associated with only 1 of Data Entity A.
ENTITY A
ENTITY B
Data Entity A may be associated with 0, 1 or Many of Data Entity B, but Data Entity (if it exists) is associated with only 1 of Data Entity A.

This logical data model reflects how a trucking company may want to run its business.

The extraction of information from such a business-oriented data base can be achieved by high-level or query languages provided by current DBMS products, or as part of most relational data base packages.

However, use of these end-user facilities should be preceded by a logical definition of the major procedures needed to support business strategies, which will allow corporate goals to be attained, Rollason explained.

Procedure Formation

The procedure formation technique is ideal for building this logical view of procedural strategies, he said. Procedure formation is a design approach whereby the data itself defines the procedures needed to create and maintain that data, based on the business understanding provided directly by users and management.

By applying the technique, users and DP analysts develop a template of business procedures and requirements, he said. A cross-check against the original corporate objectives then allows major decision-support procedures to be identified and documented.

The physical implementation alternatives and strategies can be more precisely selected to match the true needs of the business, now and in the future, than has been possible with the feasibility study and requirements specification approach used in the past, Rollason said.

Instead of masses of paper, concise documentation — which opens up new business opportunities and benefits — is produced, he said, and this leads directly to physical data base implementation and to synthesis of program logic, which will allow data to be updated. It also leads to logical specification of key decision-support procedures, allowing easy selection of packages or end-user facilities for their implementation, he added.

With the provision of powerful new end-user languages and data base systems, and further extension of the information center concept, chaos will reign in the proliferation of user-created systems, which are developed unless these new facilities are coordinated with corporate plans and supported by analysis and design techniques that can be directly applied by users, he continued.

There is little doubt that user systems, like mushrooms, will explode everywhere as more people become familiar with the available microcomputer systems and each see discrete benefits in separate, uncoordinated applications in their own area of responsibility, Rollason said.

The probable result will be similar to the early '70s in the misapplication of data base technology, he warned, but with a potential for chaos orders of magnitude greater.

If we adopt the premise that all that is needed is new end-user software, this chaos will be assured, Rollason said, but if we marry this with powerful new business-oriented analysis

(Continued on SR/40)

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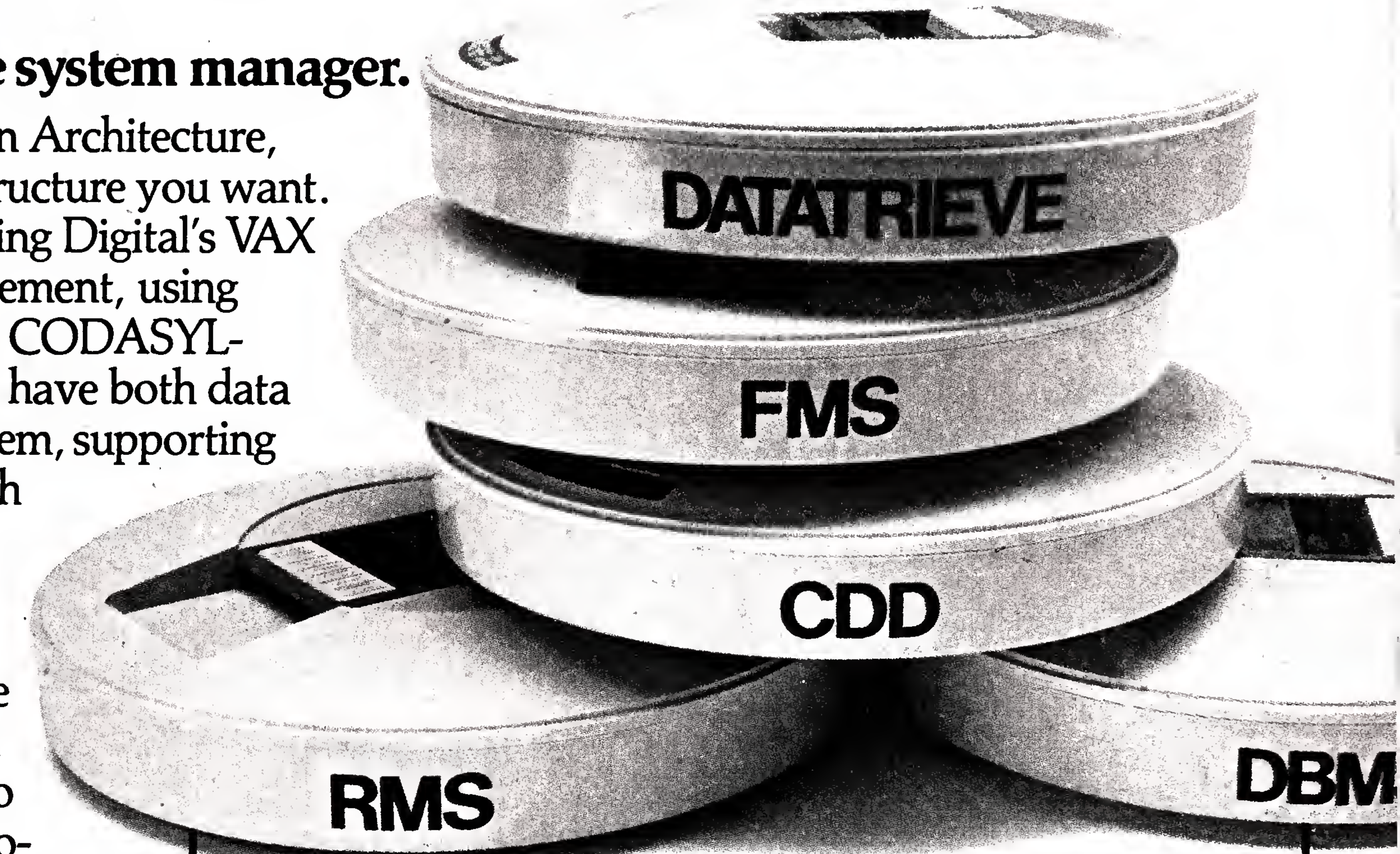

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End-User Languages: Why Slow Acceptance?

By Peter Ciampi
Special to CW

There is an inherent time lag between discovery of a new technique and wide acceptance of it by the computer industry.

It takes events such as published success stories, a diffuse group of people who have used the technique, a plethora of courses on the technique and a stated need before a new technique is accepted. These events have not occurred with end-user languages, although they are imminent.

They have occurred, however, with structured programming and the attention paid to this is the second reason why end-user languages have not been widely accepted.

Structured Programming

Structured programming reached the commercial computer industry in the early 1970s, after spending its necessary residence in academic circles. It was looked at as the cure for software costs. It has not met these high expectations.

Structured programming does not change the language we use for software development, but is a perfection of existing software development techniques. New methods of software development are needed for a quantum jump in productivity. Surprisingly, these methods have been available with end-user languages, but the focus on structured programming has diverted attention from them. End-user langauages, at least in their present form, are not applicable to certain problems and in these situations, structured programming with Cobol-like langauages should be used.

Among the technical reasons that have delayed acceptance is the natural contradiction between popular data base systems and the convenient use of end-user languages. Current data base systems use network structures, where the meaning of data depends on its "place" in the structure —i.e., the data has context meaning.

Network structures also require navigation through the structure to locate data. These network structures are efficient, but with decreasing hardware costs efficiency is no longer a major concern. When this lack of concern over efficiency is coupled with the understanding of sequential files that we have obtained from relational data base theory, we are led to "planned" sequential files. These point to the use of end-user languages because they are natural.

When we address information outside the computer, it is sequential. Examples are book indexes, stock tables and airline tables. In the early days of computers, files were sequential and we are returning to them. However, these are planned files that follow the precise rules of relational data base theory.

With the rising cost of software and the high potential of end-user languages to reduce these costs, it is surprising that these languages have not become widely used. Peter Ciampi discusses the reasons for this lack of acceptance and how obstacles are eliminated as end-user languages become more common.

Until recently, end-user languages only addressed a limited portion of the application development spectrum. This is a second technical reason why they are only now emerging. Any computer system can be viewed as having five functions: (1) Receive and verify input; (2) Update the data base; (3) Perform computations on input and/or data base records and/or intermediate data; (4) Extract data from the data base; and (5) Format and

(Continued on SR/40)

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Business User Seen Key to Effective Design

(Continued from SR/35)

and design techniques, the productivity benefits of these new languages will be magnified many times over.

What the information center approach demands, to ensure success, is a data model designed by users, but with active, preplanned security and audit provisions, he continued. Also essential is a plan that defines how users will be allowed to implement and access parts of that data model. It then becomes possible to manage the proliferation of minis, micros and intelligent terminals with their accompanying files or DBMS, Rollason added.

Certainly a major part of such an environment are powerful new communications management software and facilities, he said, but a data-oriented analysis and design approach provides the techniques and tools that establish the development plan to avoid the data chaos.

A data dictionary — which records what happens as some or all of the attributes making up a data entity are moved from the organization's data model into a given file or DBMS as a physical structure — is essential, he maintained.

There is no reason why the same logical model cannot be implemented in as many physical structures as needed, he said. If this approach is taken, Rollason continued, the enterprise can control the use of its data from an audit and security point of view and, at the same time, allow users ready access to facilities that provide the information necessary to manage the business.

An essential ingredient for the success of the information center concept is the user, who should perform the major part of the design, according to Rollason. "Only then can business requirements be properly determined. Only then can a logical data model be built that provides an information foundation for the future. To do less will condemn us to repeat the past, but with greater chaos than we could every imagine," he said.

Information analysis is unique in being a methodology developed to allow users to perform the logical data modeling exercise. Contrary to their traditional involvement, DP systems specialists take a more passive quality control and documentation support role in an information analysis project, but also provide essential project management skills and skills as "methodologists."

Problems Limit User Languages

(Continued from SR/38)

print data.

During the last several years, the most popular end-user languages — Cullinane Database Systems, Inc.'s Culprit and Informatics, Inc.'s Mark IV — were directed at functions four and five, causing several difficulties. First, these languages were not applicable to systems that did not have a large portion of their work in data extract and format and print.

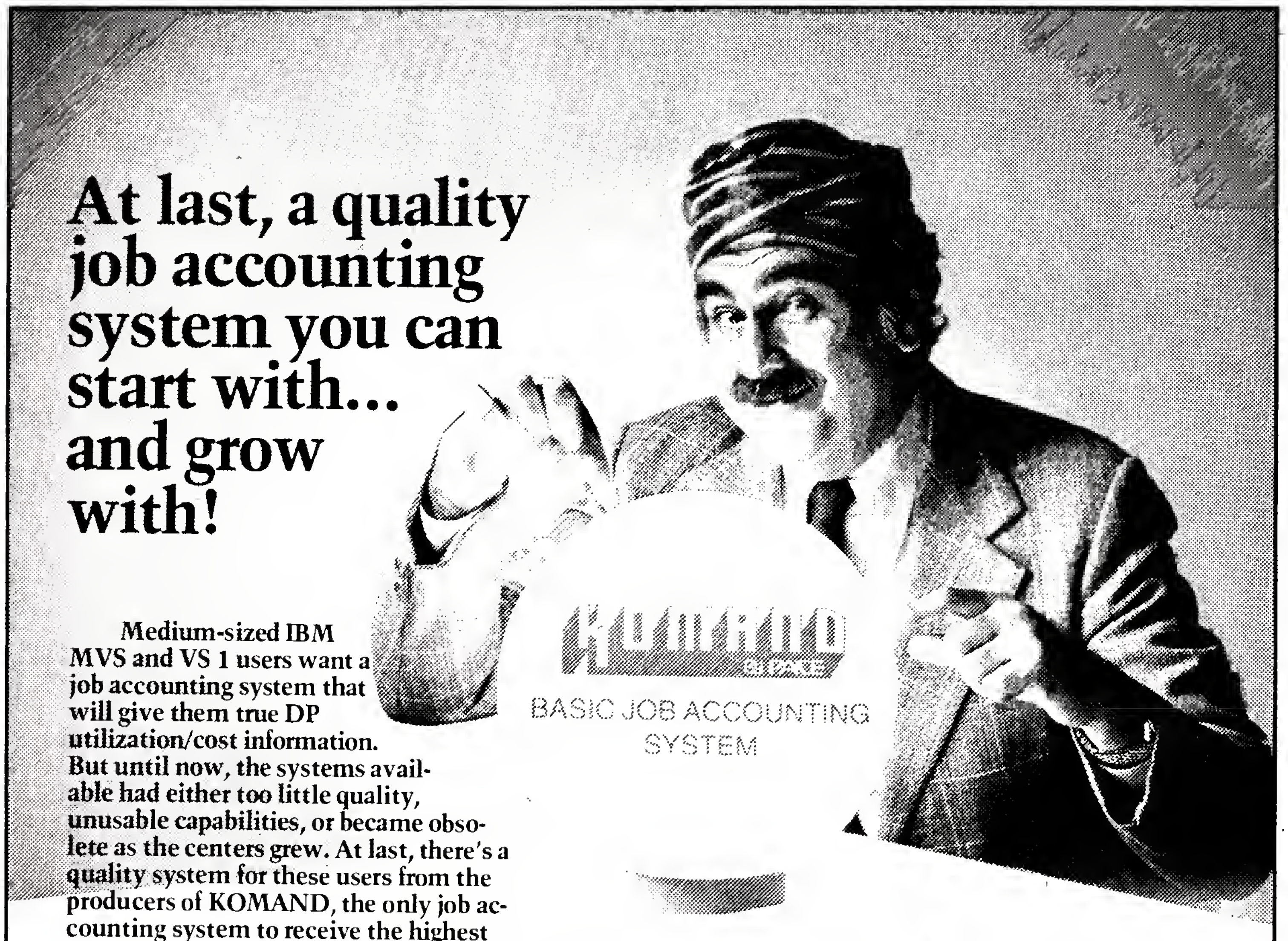
The complexity of data base structures and the limited scope of end-user languages are two technical reasons why these languages have not been widely accepted, but they are related. Function two, update of the data base, could not be conveniently embedded in an end-user language if finding data required a context definition and navigation rules. However, with sequential files context meaning is less pronounced and navigation is nonexistent. Thus, because of sequential files, new languages can cover a wider scope.

End-user languages are taking several directions. Systems that have sequential-type files have developed truly powerful languages.

Since most computer systems have network data structures, these must also be addressed with more powerful languages. This is the second major direction — end-user languages that "bridge" into existing data structures. Some languages in this category are Cullinane's Application Design Language; IBM's Development Management System; Information Builders, Inc.'s Focus; and Mathematica Products Group's Ramis. These languages link to data dictionaries, simplify the interface to network structures and provide screen generation facilities.

Will these new languages replace Cobol? Possibly in many areas, but there are fundamental situations that these languages cannot handle. The fundamental case is processing that requires data from many sources simultaneously. Examples are the need for old results, intermediate data structures and multiple records. These situations are common during computations, function three, but some edits are in this category. An example is verification that must be cross-checked with pieces of data. Because of these situations, these languages should have links to Cobol.

Ciampi is a consulting analyst with Keane Associates in Wilmington, Mass.



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Application Portability

DBMS Eases User's Move From MVS to CMS

SACRAMENTO, Calif. — A principal means of minimizing conversion costs is software that provides portability of applications across operating environments.

In 1979, development began on the California Fiscal Information System (Cfis). Directed by the state's Department of Finance, the project was created by an act of the California legislature to develop a common source of fiscal information for all state operations, explained Loren Lafferty, Cfis data base principal analyst.

After a competitive procurement process, the state selected Mathematica Products Group's Ramis II as the core software for the Cfis project. Within a year Cfis was operational.

Data was being received from eight large departments that accounted for more than half of California's $30 billion plus annual budget. Cfis data bases containing more than 100M bytes of information were being accessed daily by users from both the legislative and executive branches of government.

First Conversion

Despite the scope and complexity of its mission, six months into its second year Cfis was faced with its first conversion. Up to that point, all processing had been carried out at a large computer center with multiple CPUs running on MVS. Interactive communications were handled via TSO.

However, with its heavy load of batch and transaction processing and interactive applications, this configuration was unable to meet Cfis response time and reliability requirements. As a remedy, an IBM 4341 processor running under CMS was acquired and dedicated to time-sharing applications.

The conversion of Cfis from MVS/TSO to CMS was facilitated by the application portability provided by Ramis II, Lafferty said. It also minimized the need to retrain the large Cfis-user population. The only user education needed involved learning CMS, according to Lafferty. Some parts of the data base were restructured so that a few TSO-dependent routines could be changed to take advantage of the CMS environment, but the existing system remained the same.

In addition to permitting an application to be moved from one environment to another, portability lets common applications be distributed across multiple environments, Lafferty said. Portability also permits an application to be developed in the environment best suited for development and then moved to an environment that is better suited to production when it is complete.

The importance of this second benefit is illustrated by another state project known as the California State Accounting and Reporting System (Calstars). Staffed by personnel from Peat, Marwick and Mitchell, this effort was designed to provide a standardized statewide accounting system.

The implementation effort began in November 1980 and already 22 agencies are using Calstars, according to Peter Julicher, the project manager. Development work was carried out under both CMS and TSO, with large batch runs processed overnight under MVS on an IBM 370/168, an Amdahl Corp. V5, or an IBM 4341. All reporting from the system was done through Ramis II. In 1,500 man-hours, a five-person team developed requests to produce 60 reports from existing non-Ramis II files.

"Because Ramis II requests are so easy to change, we've been able to refine our reports to meet the specific needs of Calstars users," he explained.

Peat, Marwick and Mitchell was selected for the Calstars project because it had successfully implemented a number of similar accounting systems for other states. "In none of the other projects were the reporting requirements so comprehensive nor did they demand this level of flexibility in the reporting structure," Julicher noted.

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"The integrity of data is crucial to our success. Inaccurate or misplaced data can mean the difference between profit and loss on a multimillion dollar construction project," Ed Faulkner, director of project control information systems, explained.

Interoffice sharing of current data between district offices in Atlanta, Chicago, Houston, Baltimore, Los Angeles and Dallas was the biggest companywide problem, Faulkner explained. The company was using stand-alone systems for payroll, accounts payable, accounts receivable, general ledger and job costs, but interaction between the systems was limited. Therefore, the cost-to-benefit ratio suffered.

Payroll was another sensitive application, he added. The payroll provides input to weekly labor costs and labor costs determine whether you make money. Estimating on a project must be matched with labor costs and without a DBMS, the process was long and arduous.

Timing in payroll also was important because most job-site employees are members of building and trade unions. Union rules state that a worker is on the payroll until he's paid, Faulkner continued. With the high employee turnover in construction, an immediate means of phasing someone off the payroll is imperative. Local handwritten checks must be interfaced and included in the computerized payroll system.

Three years ago, HCB devised a plan to evaluate and select a DBMS. The company began with a study of its basic operations and tried to identify how that information was being utilized in the company, what its existing file keys were and what they might be in the future. "We wanted to select a DBMS based on how our company was run instead of having to modify our operations to fit the requirements of a system," he explained.

After a lengthy evaluation, a final DBMS corporate plan was developed. HCB decided to establish an in-house computer facility that was user-oriented and through which all access would be on-line at the terminals. Input would be distributed at the job sites through on-line and remote job entry terminals so that a person having access and control of data also would have responsibility for the integrity of that data, Faulkner said.

The plan was to first convert existing applications such as payroll, accounts payable, job costs and general ledger to provide the basis for other applications.

In order to establish a standardized companywide estimating system, the company wanted a data base here in Dallas, which would be accessible to each district. The next step was securing hardware and HCB selected an IBM 4331 running under DOS/VSE, 3370 disks, Telex Corp. tape drives, and Codex Corp. 68/20 job-site minicomputers.

Criteria for Software

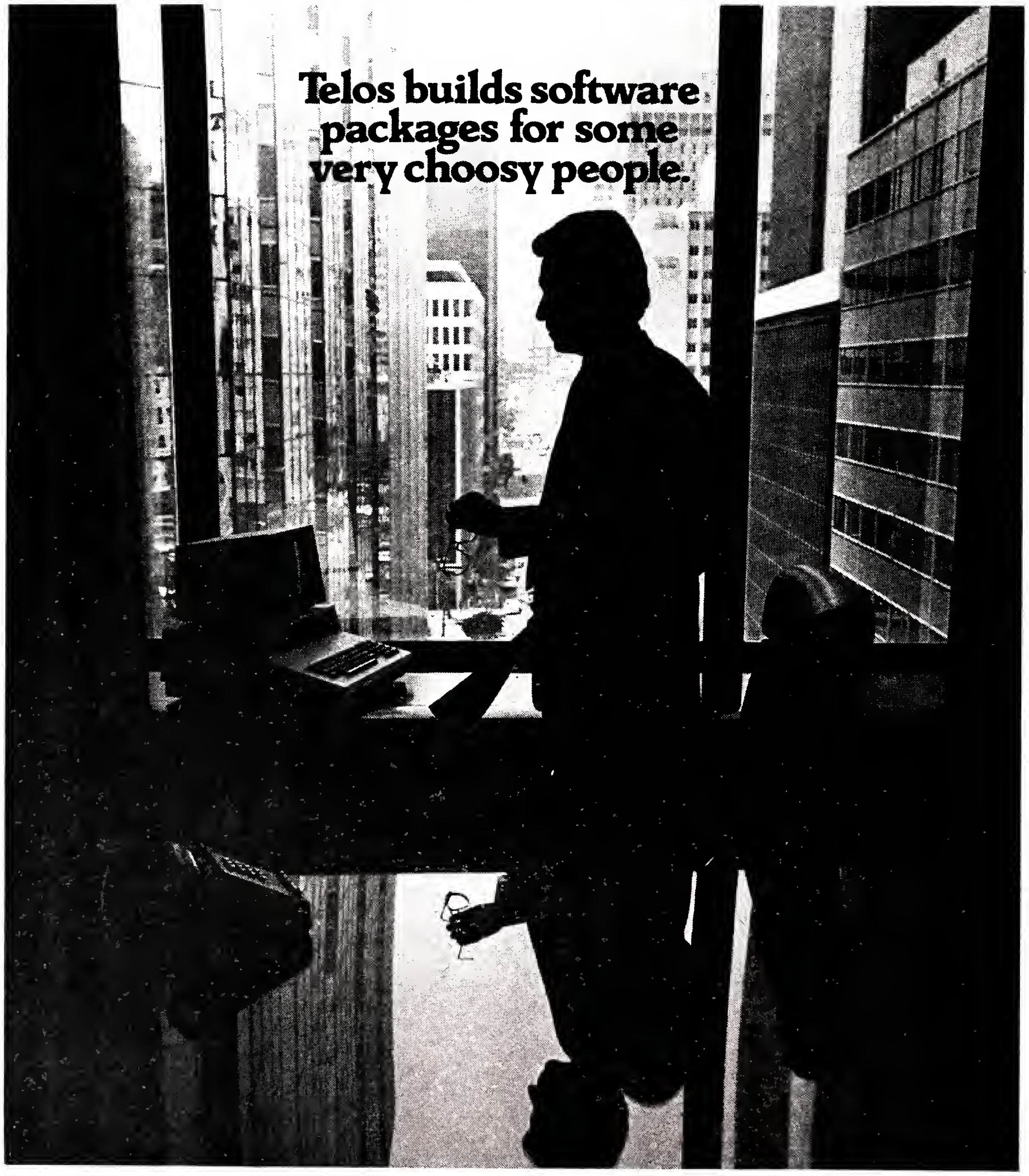
The criteria for software included: Cobol compatibility, security, systems accounting, recovery, concurrent batch/on-line and concurrent application program access, an inquiry/retrieval (query) facility, a report generator, logging facilities, data dictionary support, a telecommunications monitor, data reorganization, fine tuning, generic search, sequential processing, utility programs and technical support.

Another requirement, according to Faulkner, was reasonable prices to fit HCB's budget.

Fifteen proposals for software utilizing these criteria were sent to vendors. Applied Data Research, Inc.'s (ADR) Datacom DBMS was one of three finalists and the vendor the company selected. One reason ADR was chosen was its on-line monitor, Faulkner explained. "Equally, if not more important about Datacom was that it allowed us to maintain a 12-person technical staff — instead of having to increase it to 21 as another vendor had projected."

Another important factor was ease of use, he said. "Our staff is relatively inexperienced, having an average data processing background of less than two years."

The other products the company acquired from ADR include Librarian, Meta-Cobol and Vollie. Faulkner said these have served to increase programmer efficiency.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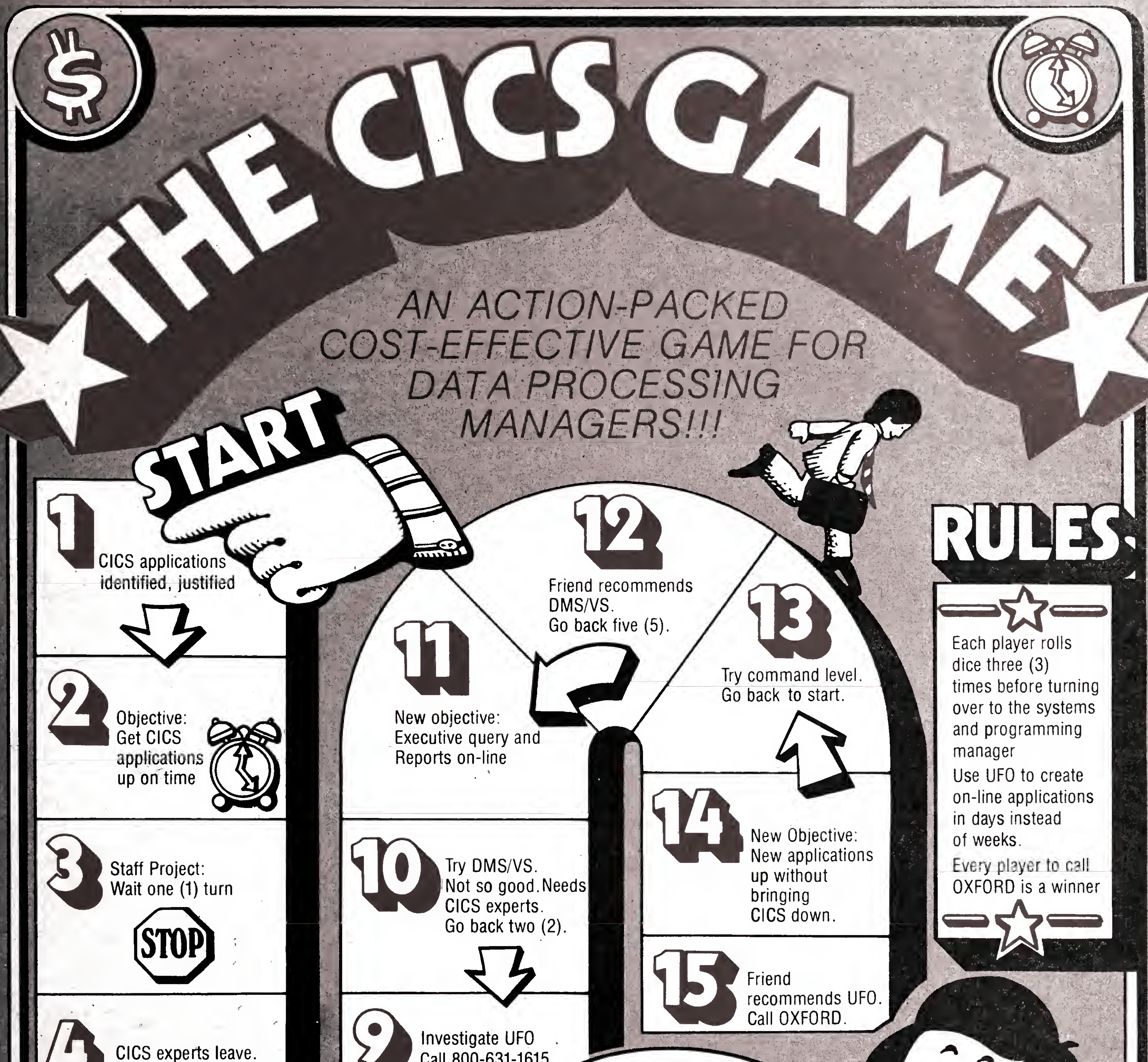

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11 New objective: Executive query and Reports on-line

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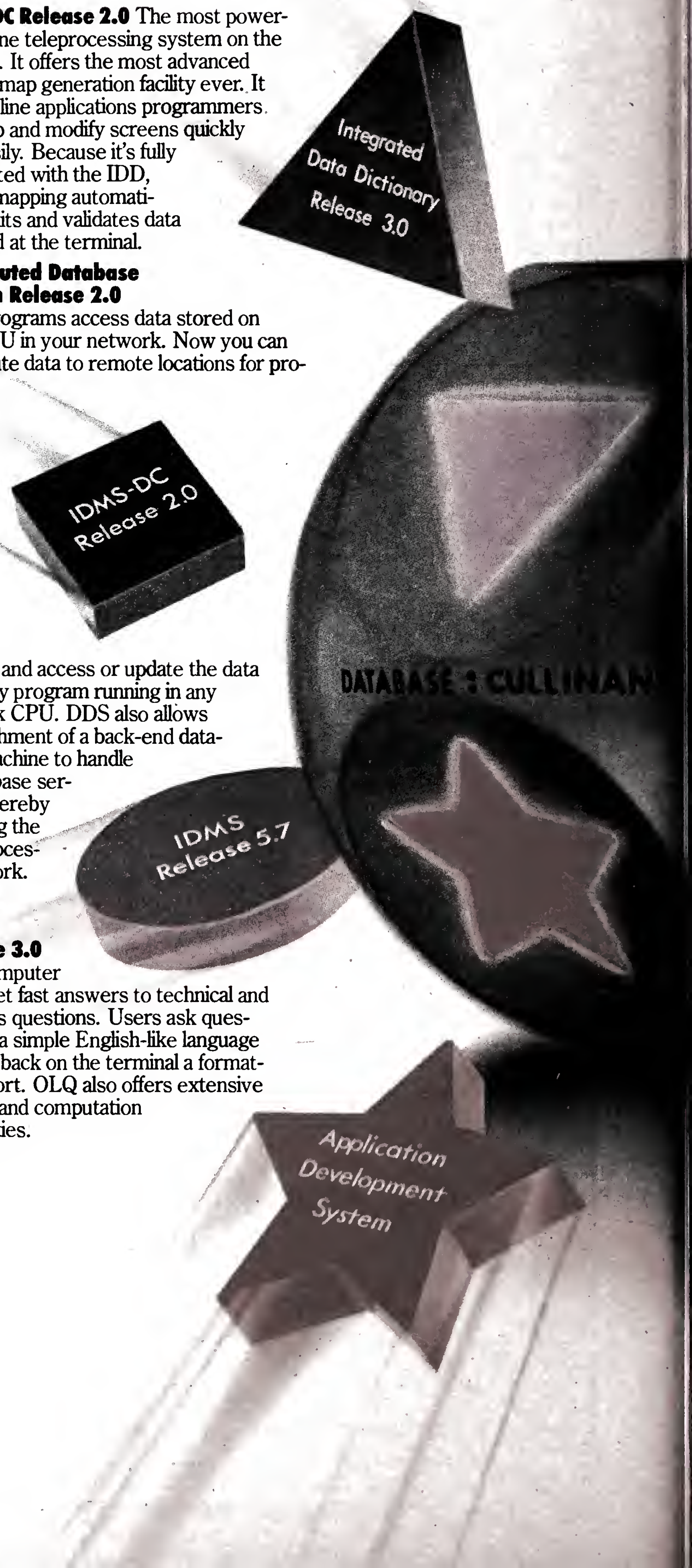
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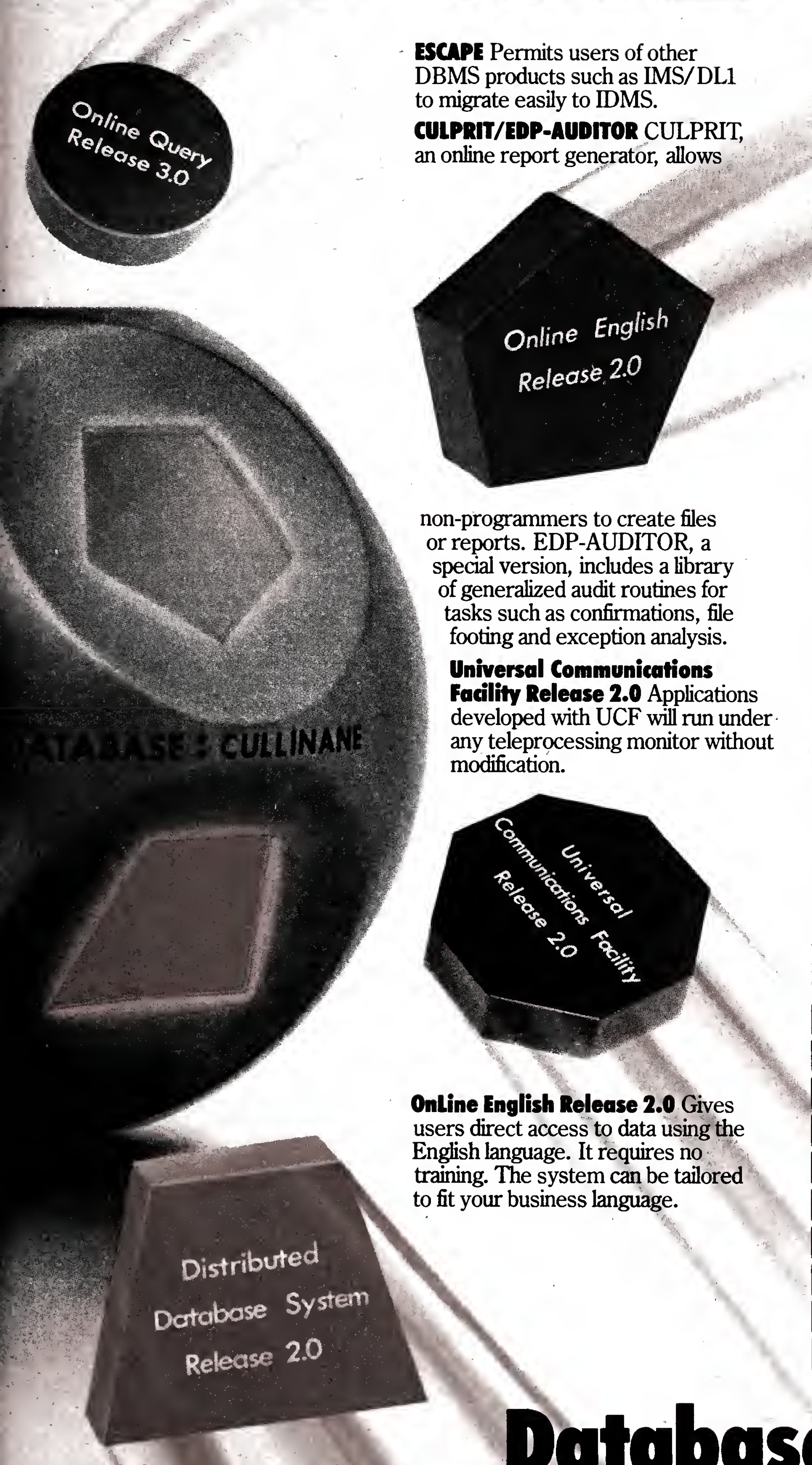
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DBMS Aids Safe Handling of Nuclear Materials

RICHLAND, Wash. — A data base management system (DBMS) is helping ensure the safe handling and accountability of nuclear materials at a major government research laboratory here.

The nuclear fuel experiments are conducted at the Westinghouse Hanford Engineering Development Laboratory, which is operated by the Westinghouse Hanford Co., under contract from the U.S. Department of Energy. The laboratory uses a Prime Computer, Inc. 400 system to track all its nuclear materials as they pass through numerous cycles and operations.

Previously, the laboratory relied on a manual card system that did not offer the capability needed to track materials in real-time, according to Dr. Robert L. Carlson, manager of safeguards applications.

"The old system kept track of when a scientist or technician transferred nuclear materials from one location to another, the date of the move and what happened to the material. It did not, however, permit errors to be recorded until periodic reports were prepared. Information had to be recounciled from several different reporting systems," Carlson said.

"The laboratory needed a computer system that would keep track of all nuclear materials in a real-time manner," he continued.

Striving for Accountability

"We've been working toward real-time accountability since 1970," Dr. A.W. DeMerschman, manager of safeguards and materials management, explained. The laboratory installed the Prime system in 1979 and brought on-line in late 1980. It has 1M byte of main memory, three 80M-byte disk drives and six terminals. Future expansion will add approximately 14 terminals linked in a distributed network to systems located in nearby laboratory buildings.

Among the nuclear materials being tracked today by the laboratory, using the data base management system (DBMS), are plutonium, uranium and thorium, all of which must be precisely controlled under U.S. federal law and international nuclear nonproliferation agreements.

The data base, which includes both classified and nonclassified information, provides process control information for laboratory operations and maintains a physical inventory account of the nuclear material. In addition, it supplies the Department of Energy with accountability and safeguards information.

Security Checks

"The Prime system allows us to perform extensive security checks quickly to make sure people not authorized to access classified information cannot obtain it," according to Phil Ruemmler, Westinghouse Hanford data base administrator and computer scientist.

At present, approximately 40 people use the system for production and development work. Each employee has a specific authorization level and password.

"Every step performed is modeled by the computer in the data base," Ruemmler explained. Movement of nuclear material from one location to another is a two-step process, for example. The computer first checks to assure the change will not exceed safety criteria. If it does, authority to proceed is denied. If not, permission is granted. The second step changes the inventory records as the material is moved.

"Each time an employee alters the status of the materials, we keep track of that person's identification, the date of the change and what occurred," Carlson said. "This way we keep a total history of everything going on in the laboratory concerning nuclear material." Computer records of these transfers are used to compile government reports, as well as maintain nuclear materials inventory records.

Users Receptive

Employees were receptive to the Prime 400 system when it was being readied in the fuel laboratory, programmer Diane Graham said.

Using the current system, up to 20 material transfer reports are prepared daily. Software development is now underway so the system can accommodate several hundred transactions per day when additional fuel fabrication activities begin. Eventually, a new fuel fabrication line will become operational at Westinghouse Hanford, with thousands of material transfers monitored by computers.

Another important characteristic of the Prime DBMS, according to Westinghouse Hanford computer scientists and programmers, is the source-level debugger.

"As far as I know, we are the first laboratory in the U.S. to produce a fully integrated system for nuclear materials accountability," Carlson said.

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Sales to Hit $1.5 Billion by '85

Dramatic Rise in Data Base Computers Predicted

SAN JOSE, Calif. — Even the least optimistic scenario suggests that revenues for data base computers will reach nearly $1.5 billion by 1985, according to a market analysis just released by Creative Strategies International (CSI), a market research and consulting firm here.

Skyrocketing overhead costs, performance bottlenecks and other dilemmas that plague the information processing industry are providing a powerful impetus to the development of data base computers, the report concluded.

As end users struggle to manage increasingly large amounts of data and to handle numerous applications, market demand is intensifying for this product concept.

Least Costly Solution

It may prove to be the least expensive solution to the vital problems of efficient, timely processing of information and host computer application requests, according to CSI.

Situated between the host processor(s) and the main memory storage devices, the data base computer assumes the data base management system (DBMS) functions of the computer network and carries out host application requests.

By off-loading DBMS functions to this specialized hardware that is external to the host processor, the data base computers augment system performance and provide a dramatic cost savings in disk storage requirements, the report continued.

The market demand for data base computers will be fueled by the need to facilitate DBMS, which are manifesting inherent limitations as they move toward becoming a de facto standard.

CSI expects the market for data base computers to grow rapidly, as usage of DBMS soars.

Among the many competitors attracted to the data base computer market will be mainframe manufacturers, DBMS software vendors, plug-compatible mainframe manufacturers, captive-market systems vendors, independent vendors and even some foreign vendors.

Target Markets

Since the data management and manipulation problems driving data base computer development are more likely to occur in the mainframe environment, the report states that vendors will target this market first. The lower price classes of the market will then be pursued with the small business computer market ultimately outpacing the mainframe market.

The proportion of the market claimed by each of the three types of data base computers (intelligent storage controllers, back-end processors and electronic file cabinets) will vary among the five price classes.

Of central importance to data base computer vendors will be the types of markets to which they should aim their products. The diverse requirements among the many industry sectors must be analyzed to match DP needs to the right type of data base computer and different market strategies will be effective for each product segment.

Because of IBM's immense impact on any DP market it enters, CSI's report forecasts the data base computer market based on two different premises: the market assuming IBM's participation and the market without an IBM presence.

IBM's overwhelming influence in mainframe, small business computer, minicomputer and distributed DP markets, is a good indication of the dominance IBM will display if and when it enters the data base computer market.

Creative Strategies' new report, *Data Base Computers*, analyzes the market through 1985 for special-purpose data base computers. Market forecasts are provided in units and revenues by product type and by five price classes, which range from Class II small business computers ($5,000 to $20,000), to Class VI mainframes ($500,000 to $3 million).

Additional projections are furnished for worldwide shipments of DBMS (and the percentage with data base computers); IBM's mainframe and CPU-installed base and data base computer pricing assumptions through 1985.

Data Base Computers, which is available for $1,200 in the U.S., provides market information on technological trends, distribution channels and potential competitors.

For further information, contact Creative Strategies International, Suite 275, 4340 Stevens Creek Blvd., San Jose, Calif., 95129.

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Management Tools Provide Speed

User Finishes Year-Long Project in Three Months

PHOENIX — Use of data base management tools enabled The National Switchboard (TNS) here to complete in three months a project that could have taken well over a year, according to Barbara Kowalczyk, senior systems analyst for its parent company, Central Management Corp. (CMC).

TNS went fully operational on a system purchased from Database System Corp. in September 1980.

TNS currently performs dealer referrals for such Fortune 500 companies as the Lift Truck Division of Caterpillar's Tractor Co., General Electric Co. and Quaker State Motor Oil, combining the use of its phone system with on-line computers.

It also processes magazine subscriptions, renewals and address changes for the *Wall Street Journal, Barrons,* and *Rolling Stone Magazine*; mails brochures and other literature for companies such as Litton Industries; and handles catalog order processing for Macy's Department Store and the McGraw-Hill Professional Book Division, a TNS spokesman said.

TNS offers on-line computerized call handling for its clients, 24 hours a day, seven days a week. The system provides incoming toll-free response to local, regional, national or worldwide response advertising.

What began in 1975 as a manually operated two-station incoming switchboard, has evolved into a highly sophisticated computerized system with 30 Block Mode Adds Regent 60 terminals, equipped to handle 5,000 to 10,000 calls per day, he noted.

The decision to convert the TNS operation to a computerized system was made in 1978 when it became apparent that the manual operation could not keep pace with projected growth. The first system installed was unable to meet the requirements in terms of service by the vendor or in technological flexibility. Each screen had to be programmed by the DP department and a new program written for every output report.

Early in 1980, after a comprehensive in-house evaluation of TNS' system requirements and long range objectives, Database Systems Corp. here was contacted and supplied with system specifications.

Through the use of a Prime Computer, Inc. Series 50 750 computer that was purchased from Database and installed on July 27, 1980, and Transact, a transaction processor developed by Database, a system evolved.

Transact includes a data base language and data manipulation system for application generation in support of Cobol, Fortran, or PL/I. File relationships, including single file, hierarchical and networked structures are supported, he said.

Facts, Database's data management and reporting system, is said to enable users to add, change, delete or display information from their files without requesting programming changes through the DP department.

TNS initially developed over 300 screens for its clients, with each screen displaying a script and input fields with which an operator can capture information. Currently, there are over 500 screens in use and new screens can be generated or changed at a client's request. Each offer advertised by a TNS client has a custom-designed screen to handle only those specific calls.

Access to each screen is provided by the use of an extension number that the client associates with the 800 number in all advertisements. When a customer responds to an advertisement, the agent displays the screen and handles the call according to the specific instructions displayed.

Agents record the caller's name, title, complete address and phone number, as well as media and specific advertisement sources. In addition, agents can verify the caller's credit card information, note specific caller requests, provide the name of the nearest dealer via Zip Code lookup and accept complex catalog orders via lookup and display of each item code, description and unit price.

Also recorded for the benefit of the client is the operator number, date and the exact time of the call, which informs television advertisers how quickly callers respond after their ad appears on TV.

TNS can process information from client calls in a number of ways ranging from simple call printout to on-line data transmission and/or automatic magnetic tape generation.

The information processed may include universal credit card slips, post card notification to callers and preparation of typed mailing labels for quick follow-up with sales brochures.

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The cause of these problems is easily explained. Soon after DEC announced the VAX, several companies noticed a great opportunity and rushed to market with their DBMS software. Some of them quickly converted their products to the VAX from other hardware. A few others took their academic research projects and tried to make them viable commercial products. If only good data-base software could be created so easily!

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The voucher comes with your company's name on it and it is not transferable. Therefore, the information that you list on the coupon must be accurate and complete. The voucher expires two months after we formally release our software, so you will have to act promptly when we notify you of the release date.

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Data Base Administrator Stresses Dictionary

GREENE, N.Y. — A data dictionary should be the key and integral part of any data base management system (DBMS), according to Robert Burke, data base administrator for The Raymond Corp. here.

The dictionary is the repository that tells "what" and "where" the data is, he said, describing it as a metabase that describes the data base itself.

The Special Products Division of Raymond, a manufacturer of narrow aisle material handling equipment, has implemented a data dictionary in just this fashion, he explained.

The company has integrated the use of the Nixdorf Computer Software Co.'s (NCSC) Datadictionary into the application systems design process so that it is a control and administration tool, not merely a documentation tool, he said. The firm's Special Products Division is currently eight months into a project to convert its old unsupported embedded pointer system into an NCSC Database system.

Complete Redesign

The NCSC Database system was scheduled to replace the embedded pointer system in a production environment in the first quarter of 1981, Burke said. This involved a complete redesign of all seven embedded pointer files (Item Master, Product Structure, Work Center, Location, MRP Requirements and MRP Replenishments) into the third normal form and a rewrite of approximately 240 programs in both Assembler and Cobol languages.

All programs were simultaneously changed to conform to the installation programming standards and tuned to run at optimum efficiency.

Burke said this was accomplished through judicious use of the installation standards, use of an on-line programming system (NCSC PDMS on-line support system) and experienced people coupled with the NCSC Datadictionary system.

DBMS Team

The DBMS project team, under the control of the data base administrator, consists of the two most senior programmers, two part-time subcontractors and as much help as can be purloined from the technical support and systems/programming departments, he explained. The team charge was to implement NCSC Database as soon as possible with minimum impact on the user departments.

NCSC Database was selected for Raymond after extensive evaluation of the DBMS currently on the market, Burke said. NCSC Database was chosen because it was the system that best fit the five-year business plan of the company.

Primary among the desirable attributes was flexibility to enable the user departments to obtain the data necessary to make sound business decisions concerning the daily running of their departments, he explained. "Successful implementation of this project results largely from strong top management interests, belief and commitment to DBMS."

Future plans for the Special Products Division include the installation of a teleprocessing system to put the manufacturing files on-line for inquiry by the owners of the system — "the users," Burke said.

Installation of a query language to complement the firm's present batch report writer will be another step toward a goal of placing more DP capabilities and technology into the hands of the user. "Without appropriate interfaces for the various levels of users, the facility will fall into disuse and fail, he said.

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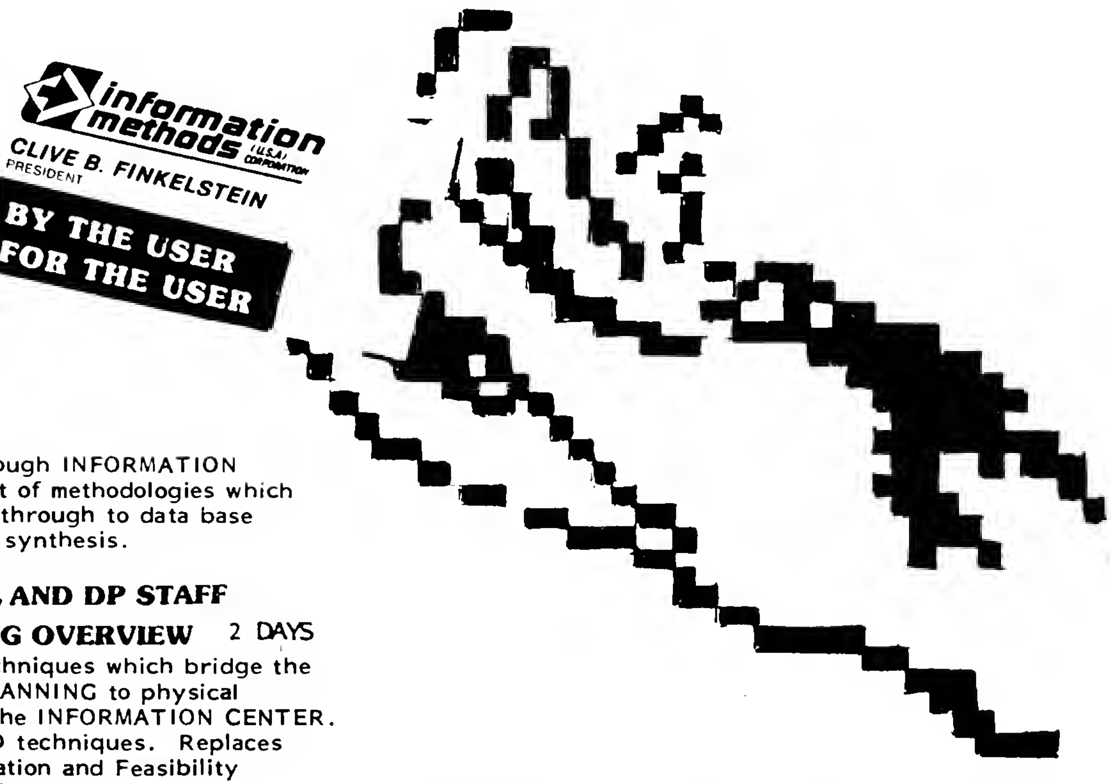

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School District Upgrades Its Data Management

By Roger Ault
Special to CW

HIGHLAND PARK, Ill. — After developing its own software for eight years, a Chicago North Shore high school district here decided to investigate a better means of data management.

Township High School District #113 consists of two high schools with a combined enrollment of approximately 4,200 students. The district has its own in-house computer system, a General Automation, Inc. 18/30 system with DNA Systems, Inc.'s time-sharing operating system. Nine remote terminals are located primarily in the local elementary school districts, for which District 113 serves as as service bureau.

The computer system is used primarily for student records, budget/finance and payroll/personnel with most instructional work being done on approximately 40 microcomputers equally divided between the two high schools.

DRS System

From 1969 until 1977, the district developed and wrote its own software. Due to ever increasing work loads and demands for information, it was determined that something had to be done.

After a review of various alternatives, it was decided to acquire a data management system known as DRS from Aeronautical Research Associates of Princeton, N.J.

The DRS system is a data management system with its own nonprocedural English-like command language, report writer, utilities and an embedded network data base management system (DBMS). Also, the system has an integrated data dictionary, without which the system would not function.

This system was made operational in October 1977. Three months later, the district's first major data base — a student record system — was made operational (Figure 1).

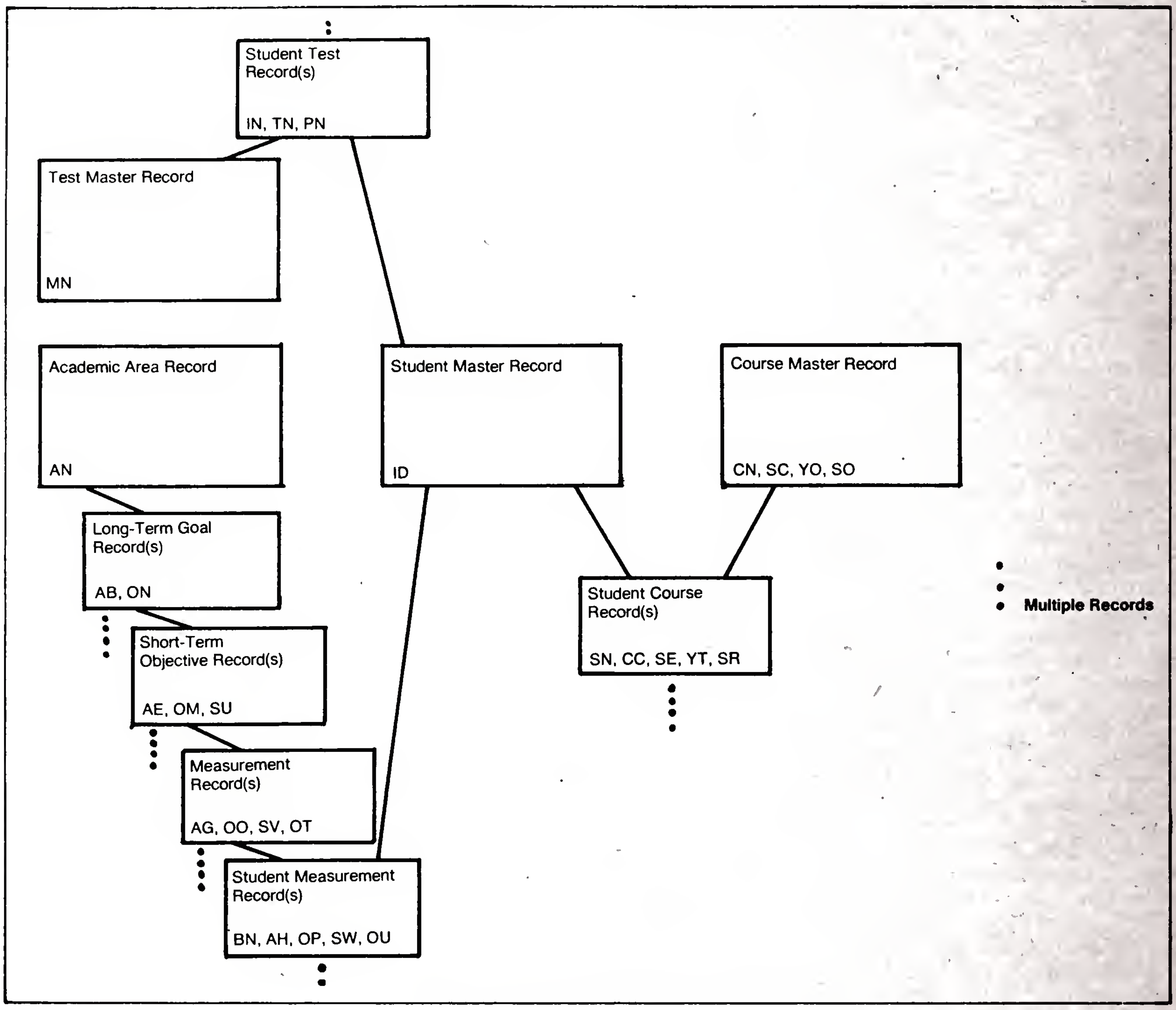

Figure 1: Township High School District 113 Student Records System

Six Fortran programs were written for a one-time use to convert the old disk files into format that DRS would accept from tape. Meanwhile, report writer specifications and "canned" procedure files were developed as needed over the next eight to 10 months.

Work also was progressing on converting the aging personnel system

(Continued on SR/52)

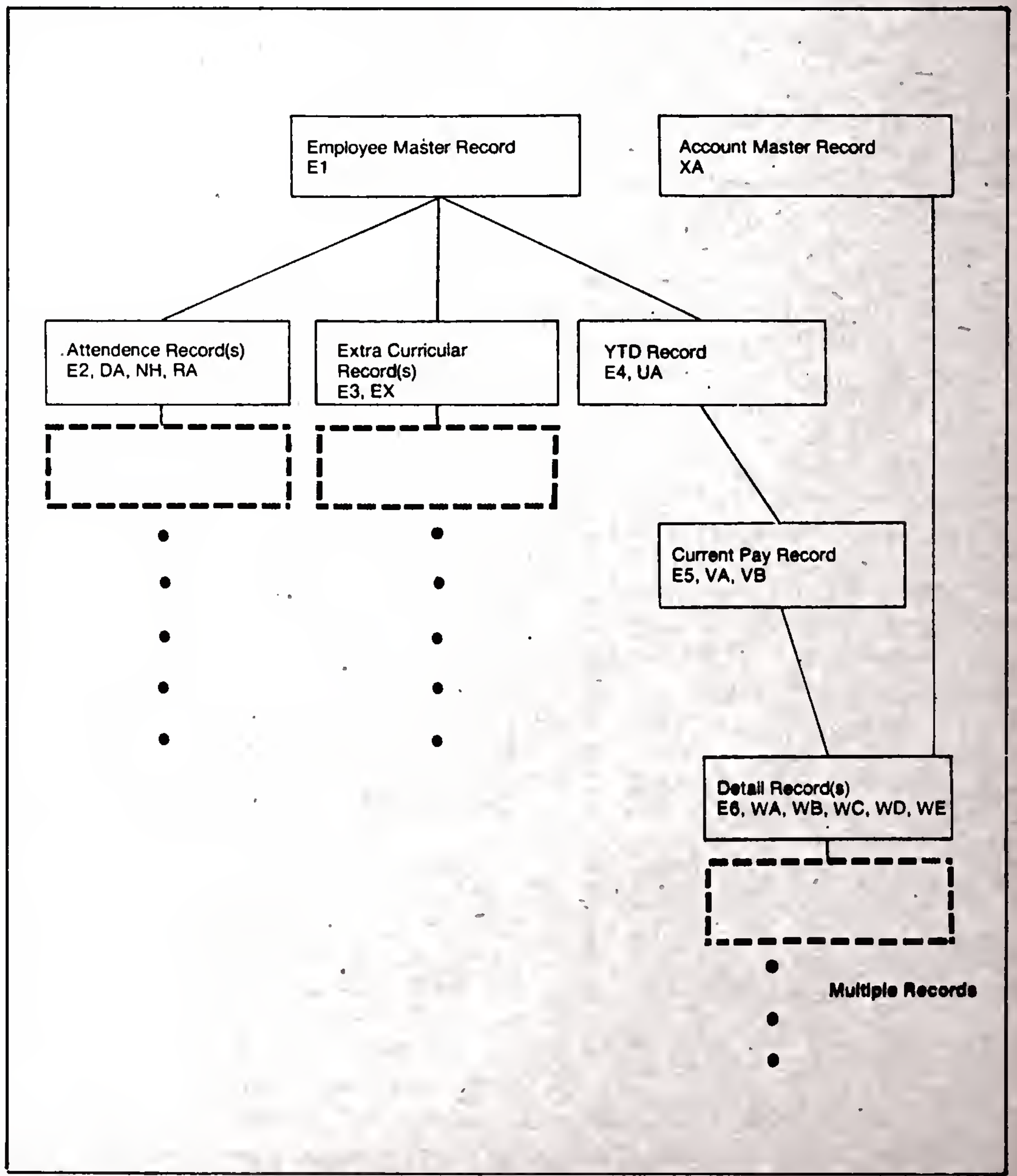

Figure 2: Payroll/Personnel System

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School District Looks Outside To Upgrade Data System

(Continued from SR/50)

to run as a DRS data base. The new personnel system became operational in January 1978.

One of the goals was to combine this new personnel system running under DRS with a payroll system that would replace an in-house Fortran payroll system, which had been in operation since early 1970. This was accomplished in December 1978. (Figure 2). Since December 1978, three of the four elementary school districts serviced have been converted to the new system.

The district's experiences with a data management system so far have been mostly good. To date, two "conventional" programs have been written in Fortran to do special functions that could not be done efficiently using the DRS command language. One calculates taxes and the other calculates class rank. All other data base updating, retrieval and reporting has been done using standard DRS commands and functions.

Since we average two to three "nonstandard" requests for information per day, this has been a great help in more efficient use of our personnel. In terms of machine utilization, the data management system does require more hardware resources than our in-house written systems. However, this is more than offset by the additional services we are able to provide and the need for fewer technically trained personnel.

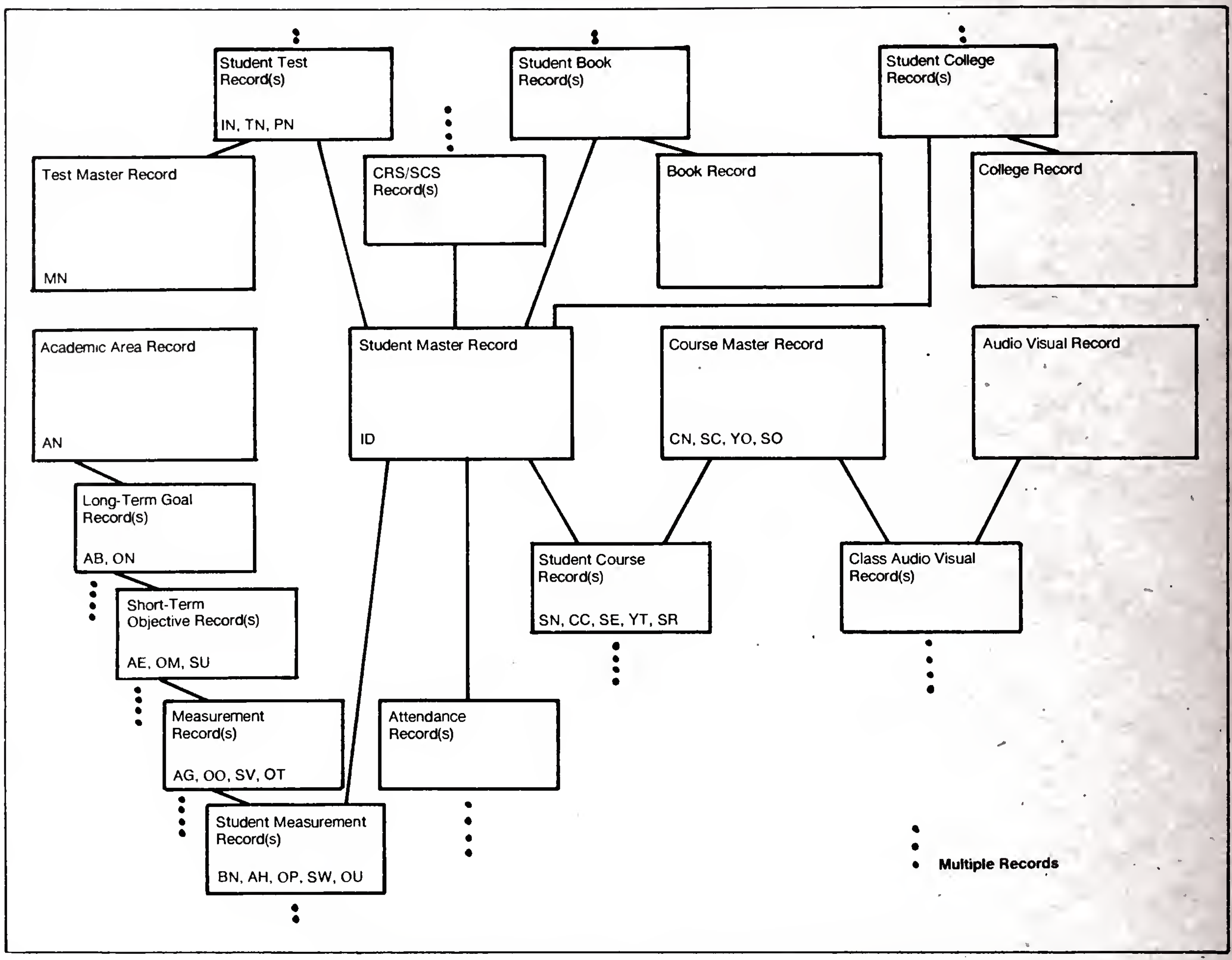


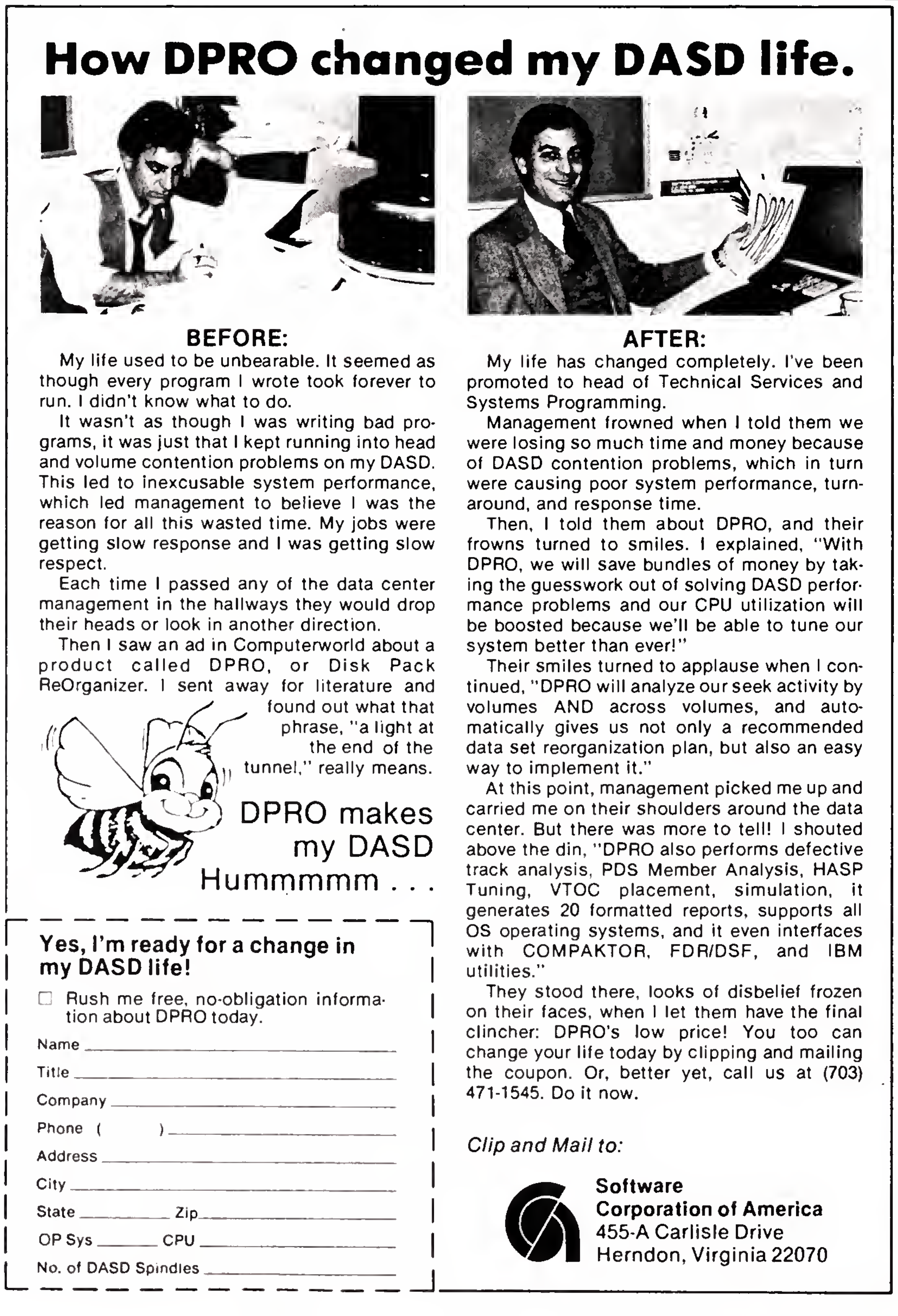
Figure 3: Proposed District 113 Student Records System

Review Plan

As our experience with DRS has grown, we have recognized there are other features that we want in a data management system that are not contained in our versions of DRS. During the past year, we conducted a rather extensive review of data management system/DBMS.

The result of this review is the "Five-Year Data Processing Plan for Township High School District #113." This plan contains projected applications, calendars, resources needed and budgets for the next five years. It includes a proposed student records system (Figure 3). This illustrates the building block approach one can take with a data management system.

Ault is the coordinator of information systems for Township High School District 113.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Their smiles turned to applause when I continued, "DPRO will analyze our seek activity by volumes AND across volumes, and automatically gives us not only a recommended data set reorganization plan, but also an easy way to implement it."

At this point, management picked me up and carried me on their shoulders around the data center. But there was more to tell! I shouted above the din, "DPRO also performs defective track analysis, PDS Member Analysis, HASP Tuning, VTOC placement, simulation, it generates 20 formatted reports, supports all OS operating systems, and it even interfaces with COMPAKTOR, FDR/DSF, and IBM utilities."

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Aircraft Center Flies High With Data Base

WEST PALM BEACH, Fla. — The Pratt & Whitney Aircraft Service Center here is using data base software tools as part of a planned effort to improve the management and use of U.S. Air Force-supplied operational field data.

The company has developed an on-line computer system called the Reliability Resource System (R^2), which allows direct user access with return response in minutes, instead of days or weeks as experienced with previous methods, according to Burton K. Holmes, customer requirements and support representative for Pratt & Whitney.

Large amounts of data are captured at the base and depot on almost every aspect of operation of Air Force engines and aircraft, he explained, and the data is passed on to many different Air Force and contractor functions.

At Pratt & Whitney, the R^2 system is the central capability for maintaining, storing and accessing this data. Through the use of R^2, a wide variety of reports and studies are accomplished, ranging from simple one- to two-line immediate queries to comprehensive, sophisticated statistical analyses.

Translation of raw data to meaningful information provides customers with parts forecasts, supportability studies, risk analyses and reliability and maintainability plots, status and tracking reports.

Key to Success

The key to success of the R^2 system has been extensive user involvement in all steps of design and implementation, Holmes explained. Because of this positive user involvement, the access requirements reflect the relationship and logical arrangement in user terms.

The user queries the system with comfortable and common terms used in his daily work. For the average user at Pratt & Whitney, no programming skills are required.

The R^2 system uses no Cobol or Fortran programs. All management, maintenance and access are done through English language commands that are logical and familiar to the user. As a result, users are more effective in translating raw data into useful, decision-making information, Holmes continued.

Like all users of Maintenance Data Collection System (MDCS) data, during the past 15 to 20 years Pratt & Whitney has been confronted with multiple

(Continued on Page 58)

The Data Base Concept — Part 1

Debate Continues on 'What Is Data Base?'

By Glenn Whittington
Special to CW

This is Part 1 of a three-part series adapted by Whittington from a slide presentation he has made over the past 18 months on the concept of data base and what it means for a company's DP operation. Next week, Whittington will discuss the distinction between traditional application systems and data base systems.

There is still considerable debate about the nature and definition of a true data base, about the administrative and technical complexities it creates and about its value and direction as the central organizing principle for a company's DP operation.

The concept itself is real and viable. It can be beneficial if the administrative and environmental issues are understood and if the system and data bases are designed in concert with the environment.

A data base can create an environment in which the goals are well defined and understood so that when technical problems arise, technical solutions can be applied for a quick, results-oriented conclusion.

Historically, applications systems have been developed separately from one another in a more or less unintegrated fashion. When the need arose to implement a second system, the company was faced with a choice if this second system needed data that was also used in the first system.

They could recode the programs and restructure the files to include the requirements of the second system; or they could build new files to accommodate new programs for a new system.

DP departments usually went ahead and constructed the new files and coded the new programs. However, as more and more new systems were created, more and more quasiduplicate files were also created.

Initially, redundancy may not be a major concern. However, problems do arise when data must be updated. At the very least, redundancy spells confusion and extra expense.

The introduction of the data base environment was billed as a viable solution to this problem of redundant data. However, most DP management viewed the new solution in strictly technical terms.

The failure to recognize that the environment had undergone a dramatic change led these managers to rush headlong into installing hardware and software to "go data base."

After the smoke had cleared and the long hours of implementation and conversion were over, their files resided on disk and JCL-specified "Share" for all data sets.

But main line processing was still sequential and time-dependent. Response time was much higher than promised and unpredictable at best. Data redundancies still existed and DP departments were still grinding out the same types of reports with the same data inconsistencies.

(Continued on Page 59)

IBM Plug-Compatible Users Gain Job-Control Librarian

COLUMBUS, Ohio — Goal Systems International, Inc. has announced a job-control librarian and job-management package for users of IBM and plug-compatible systems running under DOS/VSE.

JCLman reportedly consists of a librarian and a number of utilities to address various computer operations job-management needs. It is said to include an audit trail and a backup/restore facility. A maintenance utility is provided to allow job-control members to be cataloged, updated or displayed through batch and interactive computing and control facility.

JCLman's scheduler is said to automatically initiate jobs as directed by a user timetable. Jobs also may be manually initiated through the console or through any authorized CICS terminal. A conditional execution facility is included to allow user variables to be set and tested during job execution.

If a job abends or is canceled, JCLman's restart control allows the user to gain control and restart the job from a specified step, the vendor said.

The cross-reference utility generates reports listing all users of each device, volume, file, program and procedure. A report generator allows the user to tailor-make reports using information selected from the job-control library.

JCLman's purchase price is $4,750 for a permanent lease. It may be leased for $2,050/year or $190/mo, the vendor said. The company can be reached through 1865 Fountain Square, P.O. Box 29481, Columbus, Ohio 43229.

'VM/BPS' Provides Environment To Process Company Summaries

DANA POINT, Calif. — Pacific Systems here announced VM Business Programming System (VM/BPS), a reporting and consolidation package designed for IBM and plug-compatible mainframe users. The software also can be run on Scientific Time-Sharing Corp.'s time-sharing network.

VM/BPS is intended to provide a working environment for that part of the corporation that processes summaries rather than transactions. The new release of VM/BPS is designed for VM/CMS users with VSAPL as the host programming language. It reportedly contains three meta languages for performing calculations, designing reports and doing consolidations.

The package is said to have its own data manager and data files. Report formats and calculations are independent. Neither extensive knowledge of APL nor the use of APL terminals is required, according to the vendor. Its features include data independence, hierarchical consolidation, indirect addressing of row and columns by numeric identifiers, full editing capabilities for files and on-line documentation.

The price of a one-time license for VM/BPS is $10,000 from the vendor, Box 336, Dana Point, Calif. 92629.

Ingres Relational DBMS Offered on Time-Sharing

SANTA BARBARA, Calif. — Signal Technology, Inc. is offering Relational Technology, Inc.'s Ingres relational data base management system (DBMS) through its time-sharing connection with Tymnet, Inc.'s network.

Features of Ingres Version 1.2 include Fortran and C embedded query capabilities and a fully supported copy command for easy insertion of other data bases of Ingres, according to the vendor.

Featuring a Report Writer facility and I/O enhancements, the software is available on an as-used basis from the firm at 15 W. De La Guerra St., Santa Barbara, Calif. 93101.

Aircraft Center Flying High

(Continued from Page 59)

sources of raw data resulting in many individual independent systems. These systems and procedures contained, or were largely developed with, hard-coded rigid programs and storage techniques.

The rigidity and complexity of batch processing, and sometimes the on-line systems, inhibits and often prevents adaptations and improvements in accessing data brought about by changing mission, safety and logistics goals, Holmes said.

At Pratt & Whitney, modern software technology was used to simplify and streamline computer applications and at the same time increase the capability for access and use of raw data, he explained.

User design, maintenance and operation of the R^2 information management system has given the user control and responsive access to MDCS data, Holmes maintained. He said the R^2 system also allows response to format data content changes experienced with evolving MDCS improvements. This is accomplished with a minimum involvement of programming skills.

Building Block Design

Information Builders, Inc.'s Focus is used for development and implementation of the R^2 data bases, Holmes explained. Data bases are developed using a smaller prototype for validation and evaluation. The prototype is then used for loading the entire data set.

This building block design concept permits extensive experimentation with all data relationships and references with a minimum expenditure of time and resources, according to Holmes.

When data has been loaded into the prototype and, subsequently, the full set of data has been loaded, Focus query commands are used for extensive reporting from the data base for checkout and validations. As errors or inconsistencies are encountered, corrections and updates are made.

Focus Capabilities

The Focus reporting and query package provides capabilities that include tabular reports; full-report format control; charts, graphs, plots; and statistical analyses.

Focus can be used to read external files and to interface with host languages such as Cobol and Fortran. A Focus report can be presented on the terminal, directed offline for printing hard copy, or can write out to an external file, he said.

The implementation of the R^2 system at Pratt & Whitney has begun to yield benefits and will continue as more users are trained and gain access to the data, Holmes explained.

Elimination of redundant data maintenance and reduced manual data manipulation is accomplished through the use of the R^2 system. A shifted emphasis from data maintenance to problem detection and analysis leads to improved response to customer needs in the area of fleet management, he said.

According to Holmes, expansion plans during 1981 call for incorporation of Pratt & Whitney field reports, incident/safety findings and other in-house sources. Incorporation of major sets of data for Navy engines from the Navy 3M and AEMS engine tracking system into R^2 is also in process.

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'OLC' Provides Cost Data For OS/MVS, OS/VS1 Jobs

ARLINGTON, Va. — Komand Online Costing (OLC), a package introduced here by Pace Applied Technology, Inc., is designed to provide cost information for OS/MVS and OS/VS1 jobs, both on-line for TSO sessions and at the end of batch jobs.

Komand OLC's automatic cost feedback is intended to let operations managers immediately evaluate the cost-effectiveness of operating procedures and identify major consumers of DP resources, the vendor explained. It can also enable programmers to optimize a new system as it is being worked on and help users analyze job costs.

The software is available as an option with the Data Acquisition System of the Komand Job Accounting System or as a stand-alone product for $6,000 for use with the MVS/SE2 or MVS/SP operating systems.

The vendor is located at 7900 Sudley Road, Manassas, Va. 22110.

Cost Estimator For Builders Out

CHICAGO — A cost estimating and project control system aimed at such users as architects, engineers, contractors and insurance companies has been developed by Tectonic Systems Corp.

The software, written in RPG and Basic and running on various IBM computers, is said to produce rehabilitative and new construction costs and printouts.

The software costs $299.95 and a software manual costs $35. Optionally, the firm will maintain and update the user's cost files quarterly, the company said from 53 W. Jackson Blvd., Chicago, Ill. 60604.

IBM Offers '8100/DPPX'

WHITE PLAINS, N.Y. — A power plant maintenance package designed for use on its 8100 system under the DPPX/DMS operating system was introduced here by IBM.

The IBM 8100/DPPX Power Plant Maintenance System is designed to enable electric utility companies to implement an information system for controlling work flow — from problem request and job scheduling through completion and commitment to history.

The software is available for a monthly charge of $170 on a one-year lease.

More information is available from IBM at 1133 Westchester Ave., White Plains, N.Y. 10604.

Data Base Idea Defined

(Continued from Page 57)

Some managers thought the real problem was the specific data base management system (DBMS) that had been installed. If so, the answer was relatively simple — select a new DBMS and convert to it. But after a second smoke clearing, many firms had the same problems *and* a second DBMS to maintain.

Data base can and does work, but it will only work on its own terms. The data base environment is an entity unto itself; it must be understood and it must be addressed.

The data base environment can be shaped to reflect the management and control style of the installation, but this shaping must be done around the basic processing concepts of the data base environment.

It cannot be molded to fit the concepts that underlie the traditional batch processing mode.

Historically, applications systems have been filing systems. Designed to satisfy specific output requirements, each system was set up with its own special information input and information storage controls.

The alternative is the data base approach. It requires a complete psychological reorientation to computerization. Too many DP installations have attempted to make the move to the data base approach without making this adjustment, and the results have been disastrous.

The assumption that employing tools typically associated with data base concepts — data base administrators, data base management software and data dictionaries — will automatically result in a data base environment is an erroneous one.

A data base is a logical construct that should be built on a foundation that defines a "system" as a procedure that develops and provides input to a computer, or receives and uses output from a computer.

Whittington is the manager of data administration for Mostek Corp. in Carrollton, Texas.

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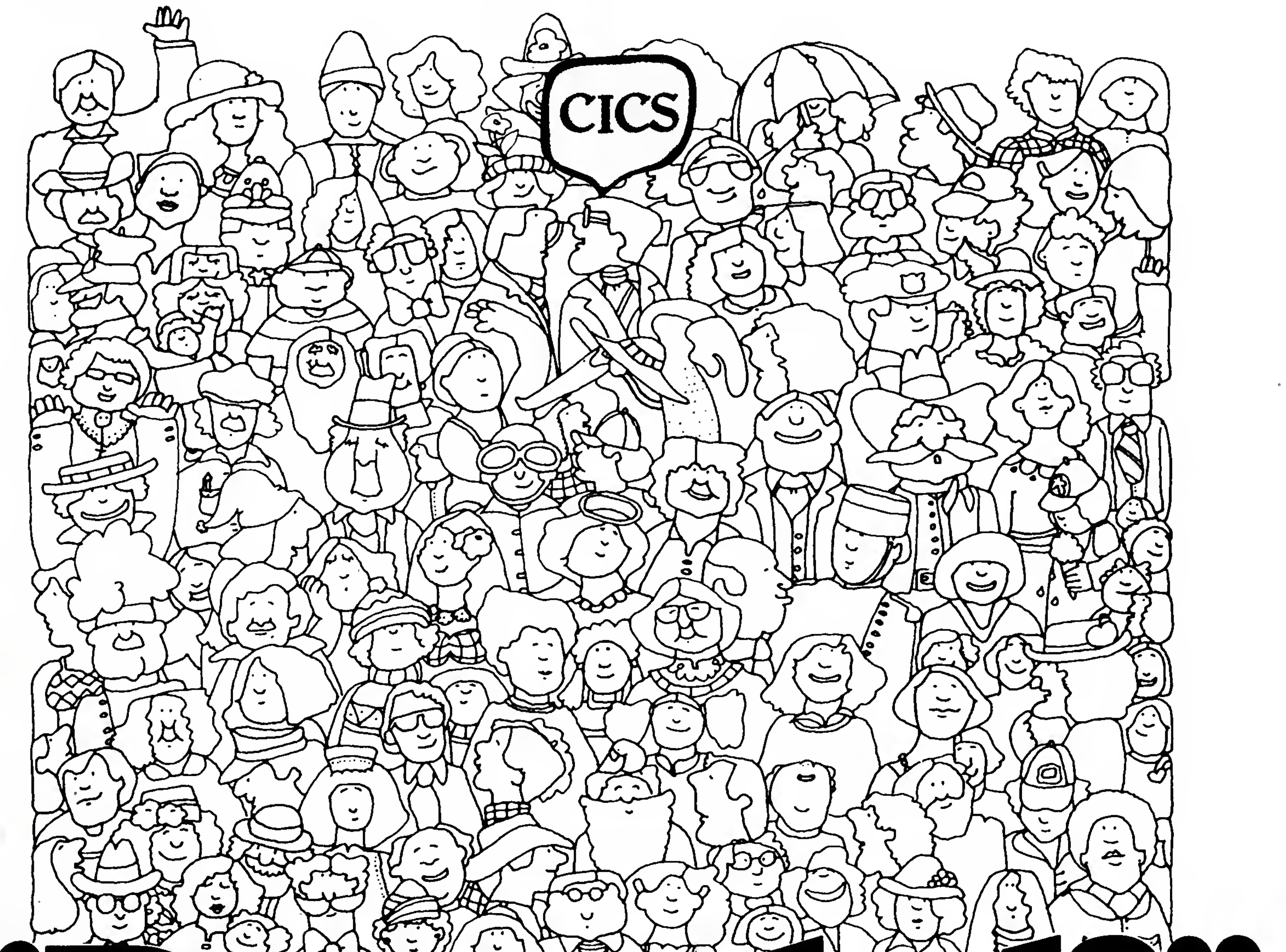

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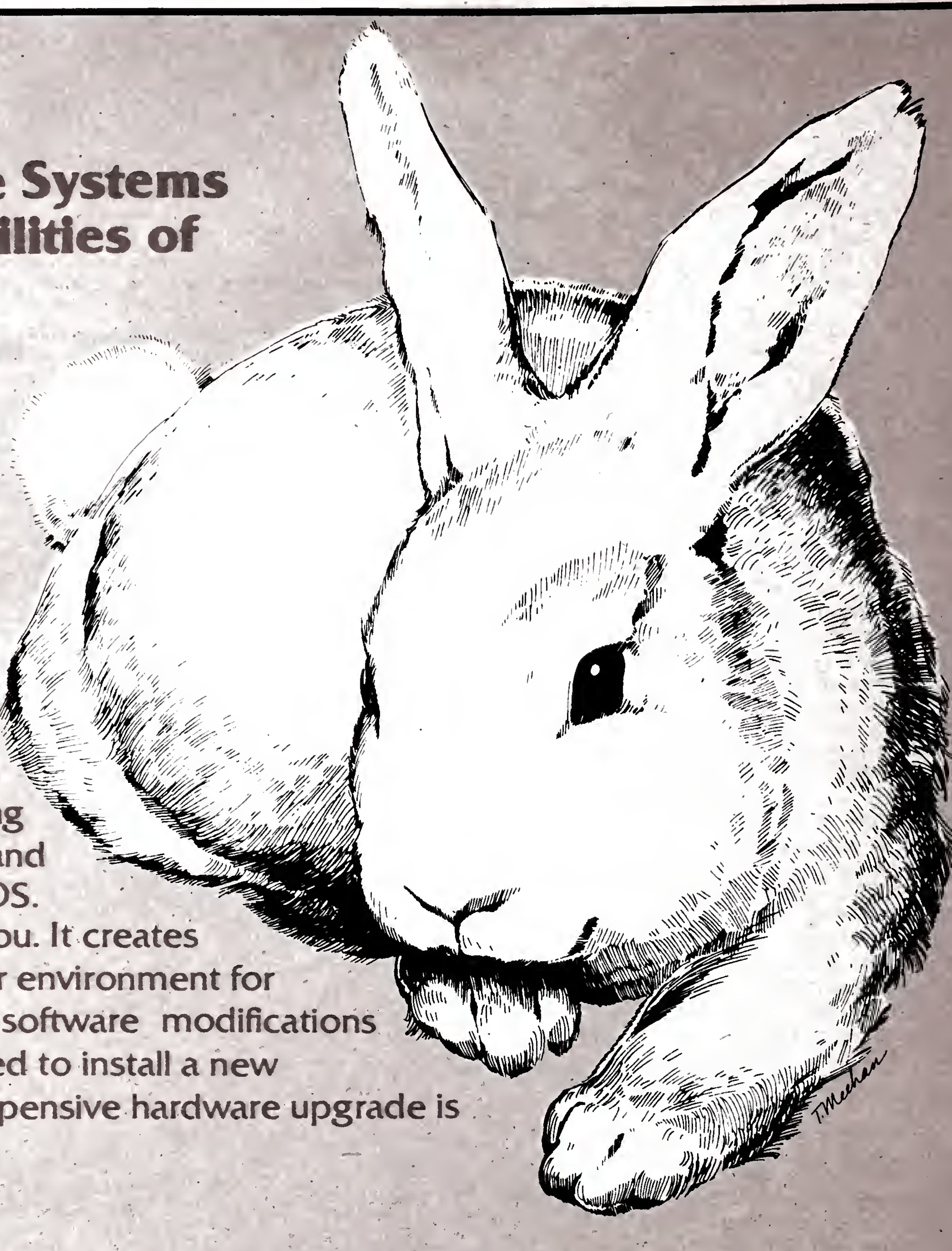

Integrated Business System Uses PDP-11s

Distributors Get On-Line Tool

WASHINGTON, D.C. — An application package for wholesale distribution companies using Digital Equipment Corp. PDP-11 minicomputers running under RSTS/E was announced here by Martin Marietta Data Systems, Inc.

Called MAS-M, the product is said to be an integrated, on-line business system made up of 10 interactive elements covering inventory management, distribution control and financial control.

Its 10 elements are accounts receivable, accounts payable, general ledger, order processing, invoicing, inventory control, inventory accounting, bill of materials, material requirements planning and purchasing, according to the vendor.

Each element can be installed and utilized separately or in combination, the vendor said.

The software is written in Basic-Plus-2 and includes a transaction processing monitor which reportedly gives users capabilities such as memory management, password protection, menu selection, forms input and extended validation and forms editing.

MAS-M is available off-the-shelf and as a turnkey system. The price per module is $9,500, the vendor said from 6303 Ivy Lane, Greenbelt, Md. 20770.

Utility Speeds Access, Aids Disk Organization

MINNEAPOLIS — A virtual unit utility for Digital Equipment Corp. systems running under RT-11, TSX and TSX-Plus which was designed to divide a physical disk into many subfile dirctories, was unveiled here by Saturn Systems, Inc.

Under Virtual Unit (VU), as the package is called, up to 8 unit/user may be active at a time, the vendor said. Once a disk file is assigned to a virtual unit, it is treated as any other random-access device. This was designed to enhance overall disk organization and segregation of programs and to speed directory access because there are fewer files in any one device directory.

Multiple files with the same file name can reside in a different VU on the same physical device, according to the vendor, to simplify backup of specific data.

Security features include an optional password for assigning data to a specific VU and specification of either read/write, read-only, exclusive read/write, or exclusive write access when data is assigned to a VU.

VU is priced at $400, the vendor said, who is located at Box 764, Hopkins, Minn. 55343.

Rabbit-3 Hops Into Accounting, Monitoring Jobs

WEST PALM BEACH, Fla. — Raxco, Inc. announced here Release 3.0 of Rabbit-3, a job-accounting and performance-monitoring software package for users of Digital Equipment Corp. systems running under RSTS/E.

The purpose of Rabbit-3, according to the vendor, is to monitor system activities and create data that can be utilized by performance analysis (Rabbit-2) and/or billing (Rabbit-1) programs. Rabbit-3 output also may be utilized by Datatrieve, as well as by Fortran, Cobol and Basic users.

Rabbit-3 is described as a stand-alone system written in PDP macro that runs in 6K- to 7K bytes of memory. It requires no system generation and contains an automatic load parameter, the vendor said.

Rabbit-3's basic price is $2,495, plus options, the vendor said from 3336 N. Flagler Drive, West Palm Beach, Fla. 33407.

'Screenshare' Enables Users To View Remote, Local Units

NEW YORK — Screenshare, a systems software product designed to enable users of Digital Equipment Corp. PDP-11 systems running under RSX-11M or RSX-11M Plus to observe activity occurring on any remote or local terminal, was announced here by Ronald G. Tepper, Inc.

Screenshare reportedly establishes a system-level parallel connection between any two terminals, providing identical displays on both. Users can demonstrate problems to specialists or the latter can demonstrate correct operation and procedures to the users. In monitoring mode, Screenshare provides an "observe-only" connection, which is invisible to the user terminal.

Other uses for Screenshare include diagnostic observation of equipment for intercomputer messages and providing slave displays for programs without incurring additional task overhead. Screenshare is priced at $1,250, the vendor said from One Penn Plaza, New York, N.Y. 10001.

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Micro System Targets Hotels

DAYTON, Ohio — A transaction processing and management information system for hotels and motels has been developed by NCR Corp. The microprocessor-based Modular Lodging System is said to automate reservation, registration, rooms management and guest accounting activities.

Central processing hardware includes twin 512K-byte processor units and integrated disk units with a capacity of 81M bytes of fixed and removable storage. The system can accommodate up to 20 video display terminals and up to eight printers.

System prices, including software, range from $72,000 to $167,000 from the firm at Dayton, Ohio 45479.

Medical Office Package Fits Datapoint or Runs on T/S

LOS ANGELES — An on-line, interactive package for appointment scheduling, patient billing and insurance form preparation for doctors, dentists and clinics was announced here by Inter-Care for use on Datapoint Corp. equipment or on a time-sharing basis.

The Patient Billing and Accounts Receivable System (Pbar) is said to utilize formatted video displays to enter and edit data, and to inquire into the patient master and transaction history files. It employs the profile technique to establish control parameter files. This technique enables each user to tailor the system to particular requirements with respect to automatic pricing, delinquency control, statement and insurance forms preparation, financial reporting and structure, according to the vendor.

Insurance claim forms for Medicare, Medicaid, Dentical and private carriers are produced on a daily or monthly basis, the vendor said. Statements are prepared in a Super-Bill or a self-mailer format.

A perpetual license for Pbar may be purchased for $15,600, with delivery and installation within 30 days, the vendor said from 2044 Armacost Ave., Los Angeles, Calif. 90025.

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The offering is made only by the Prospectus.

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IMSL Tools Fit Cray, Harris, DG Models

HOUSTON — International Mathematical & Statistical Libraries, Inc. (IMSL) has announced that its software products are now available to users of Harris Corp., Cray Research, Inc. and Data General Corp. computers.

The IMSL Library, a collection of more than 500 mathematical and statistical Fortran subroutines, is now compatible with the Cray-1, Harris H80, H100, H300, H500 and H800 models and the DG MV6000 and MV8000 models.

IMSL Twodepep, a finite element program designed to solve partial differential equations, is available on the Cray-1 and DG MV6000 and MV8000 models.

Subscription costs for the Library are: Cray-1, $3,000 first year, $2,500 renewal; Harris and DG, $2,500 first year, $2,000 renewal. Costs for Twodepep are: Cray-1, $2,500 first year, $2,000 renewal; DG, $2,000 first year, $1,500 renewal.

IMSL is located on the Sixth Floor, NBC Building, 7500 Bellaire Blvd., Houston, Texas 77036.

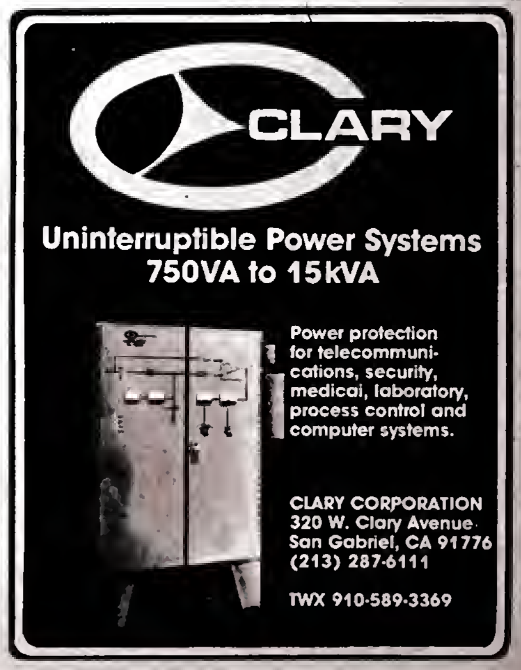
System/34 Gets Jobstream Aid

LORAIN, Ohio — Jobstream Operator Check-Off (Jocko), a package for IBM System/34 users designed to ensure that a workstation operator executes jobs in a predetermined sequence, was announced here by Triac Enterprises.

The software reportedly advises the workstation operator if there is an error and informs him what the correct job is that should be run next. The procedure, subject to Jocko, will cancel if it can handle the out-of-sequence condition itself, the vendor explained. In addition, the system operator is advised of error occurrences.

A jobstream is unique as to user and a two-character code, according to Triac. Each job step is unique as to menu name (if used) and procedure name. Minor modification of procedures to be sequence checked is required.

A license agreement for Jocko is available for $75 from Triac Enterprises, P.O. Box 570, Lorain, Ohio 44052.



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Fuel Accounting Tool Fits T/S Ultimate Computer

DALLAS — CTS Services, Inc. has developed an oil and gas company accounting system to run on its Ultimate time-sharing computer.

To access the system, a user needs a CRT terminal, printer and modem, according to CTS. Modules of the system include authorization for expenditure, joint-interest billing, revenue distribution, accounts receivable, accounts payable, payroll and general ledger.

The system features drilling analyses showing the status of each well and its demographic information and financial status, including comparison of revenue to expenses. The software is billed on an as-used basis from the firm at Suite 805, 2720 Stemmons Freeway, Dallas, Texas 75207.

T/S Service Estimates Cost For Construction Tasks

ST. LOUIS — McDonnell Douglas Automation Co. (Mcauto) has announced a time-sharing service for estimating the cost of constructing office buildings, hospitals and manufacturing plants. The service is available in 600 U.S. and Canadian cities.

Called Estek, the package creates detailed unit price estimates for 48 construction tasks such as foundation work, piping and interior finishes. Calculations are based on local labor rates and prices on 35,000 items of building material, the firm said.

Estek is billed on an as-used basis, the firm said from St. Louis, Mo. 63166.

Version 1 Of Payroll Released

LOS ANGELES — Xerox Computer Services has announced a new release of its Payroll interactive application software said to provide increased flexibility and additional payroll information.

Payroll Version 1 has 14 new features as options to reduce data entry time, provide for premium payments to a fourth shift and set limits on overtime rates and pay, the company said.

The package is available to current users of the company's on-line computer services, with new customers to receive the updated version upon installation of the on-line services at their facilities.

Payroll is transaction-priced. Further information is available from Xerox Computer Services, 5310 Beethoven St., Los Angeles, Calif. 90066.

Release 8 Of IFPS Unveiled

AUSTIN, Texas — Execucom Systems Corp. has announced an enhancement to its Interactive Financial Planning System (IFPS), said to be capable of fully automating consolidation processes.

Besides Release 8's consolidation capabilities, the enhancement is said to be able to define a set of variables for repetitive use, as well as to feature a "help" capability.

Other features include a sort capability in the report generator, a command to replace line number references with variable names, a depreciation subroutine and the option of including the What If and Goal Seeking statements as part of output.

RJE (+) Runs On Series/1

RICHMOND, Va. — Carney Associates, Inc. has released its RJE (+) Plus EDL software package for the IBM Series/1.

The package was designed for distribution of host work load to remote Series/1s. Running in either 2780 or 3780 mode, the program is said to support reader and list queues.

The programs include the RJE (+) program and file maintenance utilities. The base license fee is $6,000/copy, with volume discounts available. Source code is included, a spokesman said from 3114A W. Marshall St., Richmond, Va. 23230.

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Products Tie DEC Computers To Ethernet

CHELMSFORD, Mass. — Interlan, Inc. has unveiled a family of Ethernet local-area network products that allow direct connection for the complete family of Digital Equipment Corp. computers from the VAX-11 supermini to the LSI-11 microcomputer.

In addition, the firm announced software drivers for the major DEC operating systems and a module that allows other systems to be connected to Ethernet.

The NI1010 and NI2010 Ethernet Communications Controllers interface DEC Unibus and LSI-11 Q-Bus systems to Ethernet. With on-board buffer memory for transmitting a maximum-size Ethernet packet, they allow noncontiguous memory buffers in user memory to be chained to create a single packet.

Because of the incorporation of extensive on-board buffering, a user may install an NI1010 or NI2010 on the Unibus or LSI-11 Q-Bus in a position that is appropriate to the anticipated traffic through the controller. It is not necessary to give either unit a high primary

(Continued on Page 67)

DEC VAX-11s Get Hasp-Plus Program

EUGENE, Ore. — Datanex, Inc. is offering an IBM multileaving workstation program for Digital Equipment Corp. VAX-11 computers.

Hasp-Plus is compatible with the PDP-11 version of Hasp-Plus. It uses all the features of the widely supported Hasp multileaving protocol and can act as a central site as well as a remote workstation. The program replaces stand-alone remote job entry (RJE) equipment with a multiterminal interactive RJE environment.

The Hasp-Plus software package is organized into a communications control portion written in VAX native mode assembler language and a control portion written in standard Fortran.

The software licenses start at $5,500 for VAX and $5,000 for PDP-11s. Datanex can be reached at 207 E. 5th, P.O. Box 30008, Eugene, Ore. 97403.

Dual-Path Earth Station To Go on Beam in January

MOUNTAIN VIEW, Calif. — A "never-fail" satellite earth station that reportedly costs half as much as competing systems of equivalent capacity will be available in January from Vitalink Communications Corp., headquartered here.

Users of the Data-Trac I, which will be priced between $65,000 and $75,000, are expected to include large data communications users, banks and insurance companies as well as common carriers and computer vendors. Typical applications will include electronic mail, high-speed digital facsimile, digital voice communications, video teleconferencing, remote job entry, and computer-to-computer data transfer.

Key Feature

A key feature of the Data-Trac I is a "four-point orthomode junction" that provides two completely independent paths for outbound data and two more for inbound data. One path in each pair is vertically polarized and the other is horizontally polarized. Each terminates in a different satellite transponder.

Thus, if a component fails and one path is knocked out, the earth station degrades instead of going out of operation completely. The remaining path transmits both data streams at a reduced rate.

The earth station will make end-to-end on-site communications by satellite feasible for a user that now transmits at 9,600 bit/sec for distances of 700 miles or more. The previous boundary point was 56K bit/sec, according to a Vitalink spokesman.

A variable-rate modem reportedly enables Data-Trac I to handle surges of data as much as 10 times greater than the average throughput through the same user port address.

The new earth station consists essentially of a 5-meter parabolic antenna; all of the electronics are built into the base of the parabola. On the user side, speeds from 9,600- to 224K bit/sec can be accommodated, the Vitalink spokesman claimed.

The earth station communicates with the satellite at 28K- to 224K bit/sec using time-division multiple access, time-division multiplexing or single-channel carrier techniques to allocate the bandwidth.

According to Vitalink, multiple microprocessors distributed throughout the network handle protocol and manage network capacity so that the satellite data network is transparent to users. Initially, the Data-Trac I will support IBM's Bisynchronous, Hasp and Synchronous Data Link Control protocols. X.25 is scheduled to be added in the third quarter of 1982.

Data-Trac I costs less than its competitors partly because its electronics are comprised entirely of solid-state components and partly because it is the first earth station to be manufactured on a factory assembly line, he added. Vitalink is located at 1330 Charleston Road, Mountain View, Calif. 94043.

Supports 20 Terminal Types

Datastream Updates Net Access

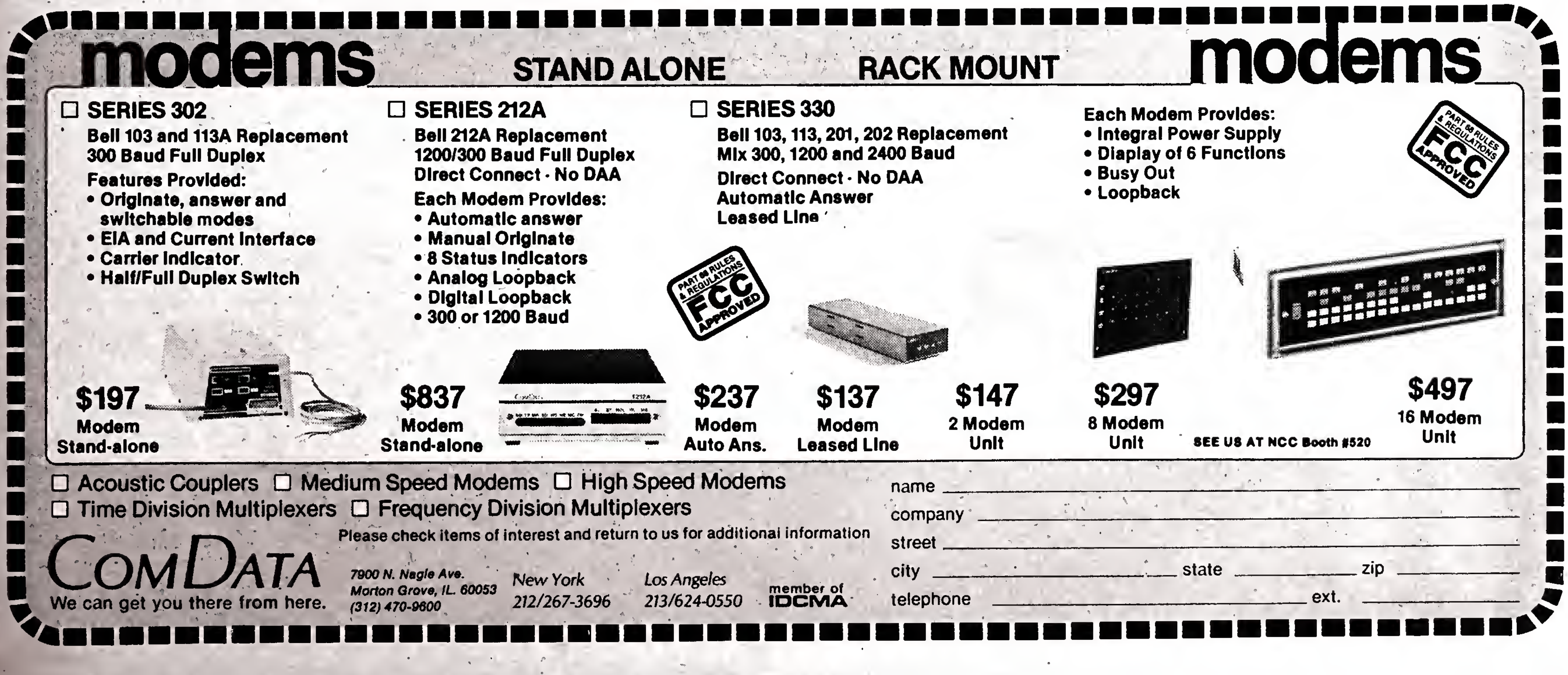
SANTA CLARA, Calif. — Datastream Communications, Inc. has unveiled two enhancements to its T7 network access communications system.

The T7, which permits Ascii access to IBM 3270 applications programs, can now support up to 20 terminal types concurrently (depending on the terminal mix) and also features a new auto log-off option that provides systems security in the event of unexpected disconnects.

Other similar systems may be read-only memory based and support the terminal types programmed in a particular programmable read-only memory. The T7 utilizes cassette-based software that incorporates the terminal translators.

The log-off option provides for a number of characters to be sent to the host in the event of an abnormal disconnect, eliminating the possibility that another user can claim the open port and access the first user's application.

The T7 costs between $10,000 and $12,000. First-time buyers receive the two enhancements as part of the product. Users wishing to add the enhancements must pay $250 for each, Datastream said from 1115 Space Park Drive, Santa Clara, Calif. 95050.



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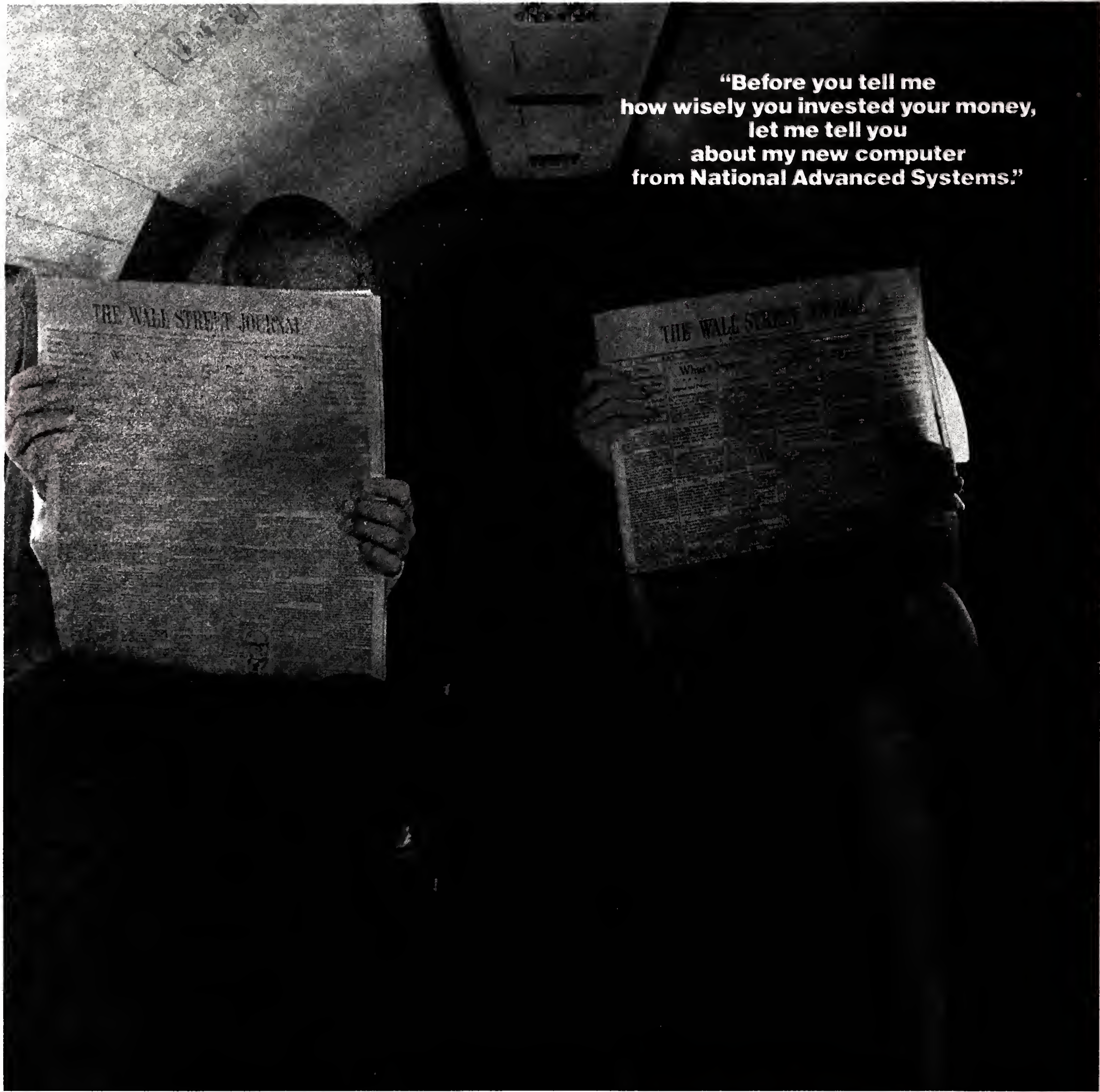

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Processor Ties IBM Systems, DEC Systems Via Hasp Link

COLUMBUS, Ohio — Software Results Corp. has unveiled Comboard, a high-speed, front-end processor that interconnects Digital Equipment Corp. systems to IBM systems via a Hasp link. The DEC system appears to the IBM system as a remote Hasp job entry workstation.

A 16-bit CPU mounted on a single hex-height unibus module enables Comboard to provide high-speed interconnects and reduced overhead. High throughput is obtainable with minimal impact on on-line operations.

The product is available in three models. The 631 operates at speeds to 9,600 bit/sec, the 731 at speeds to 19.2K bit/sec and the 1231 at speeds to 56K bit/sec. The price range is $13,900 to $26,900, Software Results said from 1229 W. 3 Ave., Columbus, Ohio 43212.

Unit Outdraws Old Ambassador

ANN ARBOR, Mich. — Ann Arbor Terminals, Inc. has introduced a CRT terminal with all the features of its standard Ambassador model plus a line-drawing character set.

The Ambassador 300 features a line drawing set defined by Ansi X3.4. Graphics symbols are provided for horizontal scan lines one, three, five, seven and nine; upper and lower left/right corners; and top, bottom, left and right "T" crossing lines and vertical bar.

In addition, the graphics character set includes many special symbols such as diamond, checkerboard, degree, plus/minus, less than or equal to, greater than or equal and not equal, the vendor said.

The terminal costs $1,595 from Ann Arbor at 6175 Jackson Road, Ann Arbor, Mich. 48103.

X.25 Tool Gets Certification

LOS ANGELES — Tekelec, Inc. has announced that its X.25 test and development system has been certified by GTE Telenet Communications. The TE 92C will operate as either an analyzer or simulator in an X.25 packet-switched network.

As an analyzer, it opens a window on an X.25 line and displays complete frame and packet-level information in interpreted X.25 mnemonics. In simulation mode, it will emulate an X.25 data communications equipment or data terminal equipment and correctly handle all X.25 data transfer and error recovery procedures.

The TE 92C costs $31,250 from Tekelec at Suite 204, 2932 Wilshire Blvd., Santa Monica, Calif. 90403.

DEC Units Get Ethernet Link

(Continued from Page G)

position on the bus.

The NI1010 costs $3,990 and the NI2010, $3,590.

The NS2010 RSX-11M/S and NS2020 RT-11 V4.0 device drivers are available for the NI1010 and NI2010 boards. They provide standard DEC RSX and RT driver functions. The NS2010 RSX-11M/S driver licenses for $1,000 and the NS2010 RT-11 V4.0 for $500.

The NM10 Ethernet protocol module interfaces directly to the 8- and 16-bit microprocessor families. It costs $2,350 from 160 Turnpike Road, Chelmsford, Mass. 01824.

Modem Replaces Bell 201C Units

LARGO, Fla. — Paradyne Corp. has introduced a 2,400 bit/sec modem designed as a direct replacement for AT&T 201C modems on either private leased or dial-up lines. The LSI 24C is said to complement Paradyne's LSI 24 modem, which serves as a direct 201C replacement on leased lines and is compatible with the firm's Analysis family of communications network control systems.

The LSI 24C is a two-wire, half-duplex modem that can reportedly be interfaced to four-wire lines. The modem is packaged on a printed circuit card housed in a stand-alone unit, 10 of which can be installed in a 19-in. rack nest.

The unit costs $1,200 from the firm at 8550 Ulmerton Road, Largo, Fla. 33541.

Graphics Printer Out for DG Unit

WESTBORO, Mass. — Data General Corp. has announced a graphics printer option for its Dasher G300 graphics display terminal.

The Model 6156 graphics printer is a tabletop, impact dot matrix printer that allows the user to print Dasher G300 graphics screen images. Character resolution is 72 by 144 dot/in. Images can be printed in full-page or ⅓-page size, the vendor said.

The graphics printer costs $1,600. A complete workstation consisting of the G300 display, keyboard and printer is $5,200, the vendor said from 4400 Computer Drive, Westboro, Mass. 01581.

Interface Board Runs on PDP-11s

ST. PAUL, Minn. — Minntronics Corp. has announced a four-channel serial interface board, the DL4-11, for Digital Equipment Corp. PDP-11 processors.

The Unibus-compatible interface can replace four DL-11A, B, C or D ports in the same physical space of a single card. It is compatible with both current loop and RS-232C interfaces and can operate at 16 transfer rates ranging from 50K- to 19.2K byte/sec.

The unit costs $1,100, Minntronics said from 2599 White Bear Ave., St. Paul, Minn. 55109.

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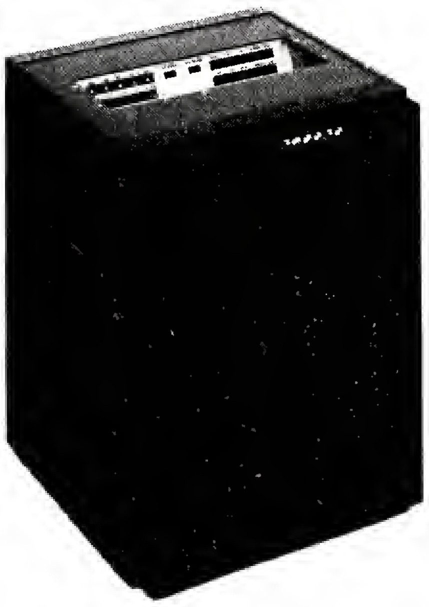

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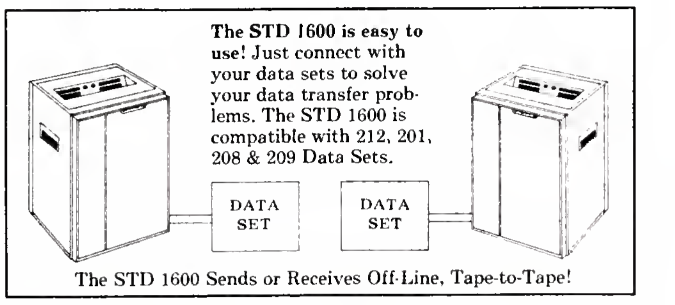

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Cara Measures CICS Response Time

NEW YORK — The Communications Average Response Aid (Cara), designed to display IBM CICS response time statistics for user-defined data transmitted to and from selected CRT terminals, has been introduced by Analysts International Corp.

Cara will display the minimum, maximum and average response times for a selected set of remote IBM 3270-type terminals. These statistics are not provided by measuring user transaction response time, but by collecting data from generated transmissions to and from the subject terminals.

Cara costs $3,900 per CPU with an annual maintenance cost of $500, Analysts said from Suite 930, 295 Madison Ave., New York, N.Y. 10017.

Runs at 19.2K Bit/Sec

Modemsplus Unveils Adapter

DECATUR, Ga. — Modemsplus, Inc. is offering a communications adapter and protocol converter that operates up to 19.2K bit/sec asynchronously and synchronously with error detection and automatic retransmission on errors.

The Brite One is a dual-port RS-232C device (with an optional parallel terminal interface) capable of performing the following adaptation and conversion tasks: Burroughs Corp. poll/select communications networks interfacing to standard asynchronous Ascii terminals and receive-only printers and downloaded prompting capabilities to facilitate operator interaction with host processors.

Visual indicators are front-panel-mounted to provide operator information on power, receive/transmit data and receive/transmit error conditions.

The single unit price is $995, Modemsplus said from 217 E. Trinity Place, Box 1727, Decatur, Ga. 30031.

Terminal Update Emulates Tektronix 4027

SACRAMENTO, Calif. — Digital Engineering, Inc. has added to its color graphics terminals an enhancement that allows them to emulate the Tektronix, Inc. 4027 terminal.

The Model DM800 Color Retro-Graphics package is being offered together with the Datamedia Corp. Colorscan terminal.

The following can be programmed and drawn on the terminal: sales and financial charts, circuit designs, topological mappings, process control diagrams and abstract physical concepts. Users may select up to eight colors (from a total of 64) for display on a 12-in. (640 by 480 resolution) screen.

The DM800 Color Retro-Graphics terminal enhancement alone costs $1,800. Fully assembled in a Datamedia terminal, the price is $4,995, the vendor said from 630 Bercut Drive, Sacramento, Calif. 95814.

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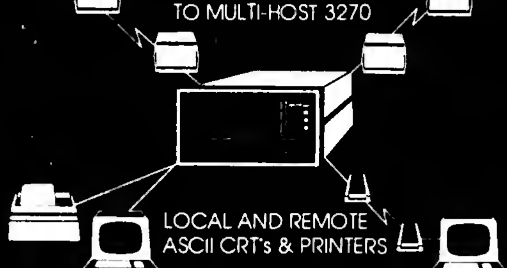
- And now you can eliminate the need for two cluster controllers when access to two hosts (or two lines on one host) is required.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Computervision CAD/CAM Options Bow

DETROIT — Computervision Corp. has pulled the wraps off a variety of computer-aided design and manufacturing (CAD/CAM) products, including a 32-bit computer upgrade for its Designer V systems, a more powerful version of its CGP-200 distributed processing computer and a number of system expansions for its Designer M family of turnkey systems.

All of the products debuted earlier this month at the Autofact III CAD/CAM IX trade show held here.

Leading off the introduction pack is the 32-bit analytic processing unit (APU). The APU is basically an add-on processor that is an extension of the firm's distributed processing architecture. It is designed to be shared by up to eight CGP-200-type processors and allows users to configure systems with more than 50 workstations.

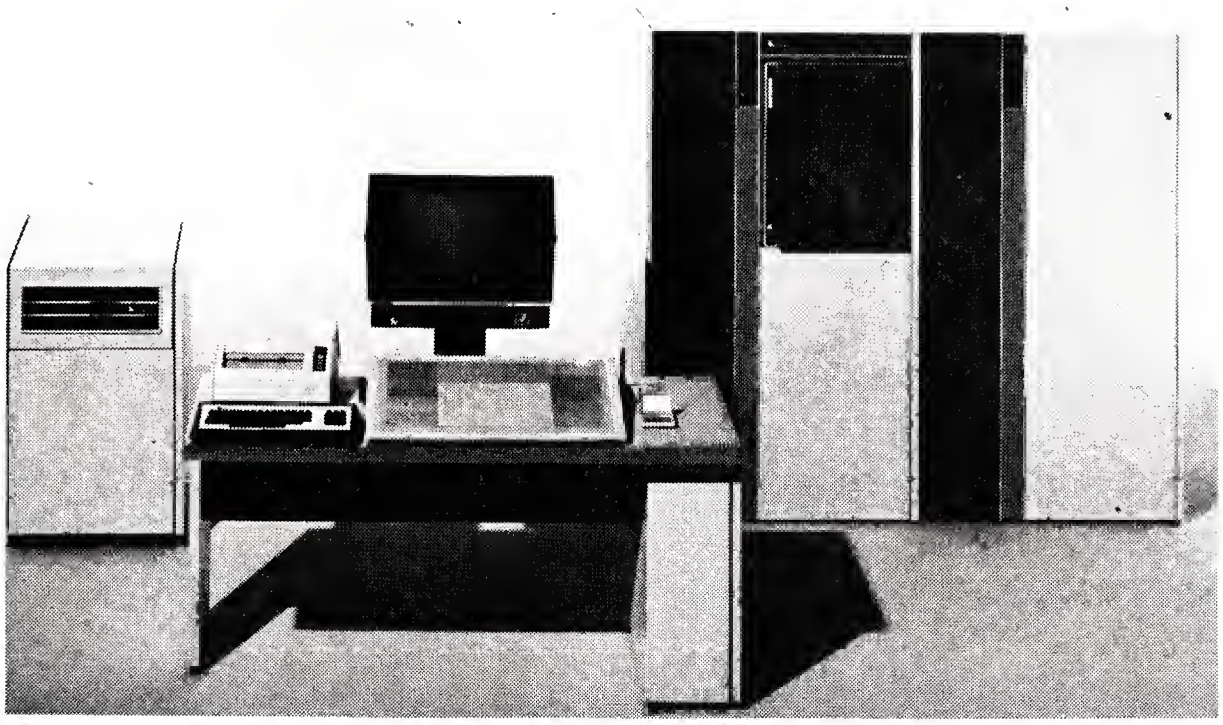
Geared to fit into the firm's Designer V system, the APU system is designed for interactive engineering analysis and shaded-picture generation. The 32-bit system and its architecture are reportedly compatible with the firm's current hardware, software and data bases.

Features of the APU include a high-performance cache memory with integral floating-point accelerator, virtual-memory support and programming tools and the ability to support interactive analysis functions without degradation of graphics performance, a spokesman claimed.

The APU system uses the recently developed Cvmos virtual-memory operating system and supports the Fortran 77/66, PL/I and Pascal languages.

Available in the second quarter of 1982 as a field upgrade, the processor costs $150,000.

(Continued on Page 70)



Computervision's CGP-200X (right), Analytic Processing Unit (far right), Instaview Workstations (center) and Random-Access Disk Storage Modules.

DEC Doubles Execution Time With Floating-Point Board for VAX-11/750

MAYNARD, Mass. — Digital Equipment Corp. has introduced a field-installable, single-board floating-point processor for its 32-bit VAX-11/750 that reportedly allows instructions to be executed two to three times faster than with a machine without the floating-point option.

The FP750 provides 60% of the floating-point performance of the larger VAX-11/780 with its floating-point processor option, a spokesman claimed.

The board's operation is functionally transparent to the user and is said to require no hardware or software modifications. The extended-length, hex-height module fits into a prewired slot on the 11/750's backplane.

The FP750 responds to 45 different operation codes to execute instructions on both single-precision and double-precision floating-point operands. It also converts data between integer and floating-point and between single-(32-bit) and double-(64-bit) precision floating-point formats, the spokesman said.

The module contains 28 gate-array integrated circuits. Processor microcode is stored in 10 read-only memory (ROM) circuits while nine additional ROMs provide auxiliary functions.

The FP750 option costs $8,500, plus an add-on installation fee of $295. First deliveries are scheduled for January, DEC said from its offices in Maynard, Mass. 01754.

Xerox 9700, 5700 Climb in Price

EL SEGUNDO, Calif. — Xerox Corp.'s Printing Systems Division has hiked purchase, rental and maintenance prices up to 18% for its 9700 and 5700 electronic printing systems.

Effective immediately, the purchase price for the Xerox 9700 will be increased 5% to about $380,000. Its lease price will increase approximately 8%, making a two-year lease arrangement cost about $12,000/mo.

For the Xerox 5700 system, the purchase price will be increased approximately 8%, while the lease costs will rise about 18%. A basic 5700 system will now sell for about $71,000. On a two-year lease, the charge for a minimum configuration will be about $2,300/mo.

Finally, maintenance charges for purchased 9700 and 5700 systems will rise about 15% and 3%, respectively.

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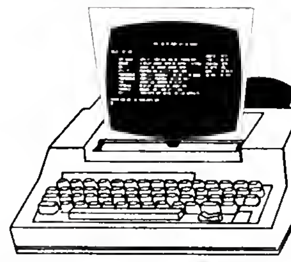

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Vector Automation Unveils Turnkey CAD System

BALTIMORE, Md. — Vector Automation, Inc. has announced a turnkey computer-aided design (CAD) and drafting system that combines vector stroke refresh display techniques with high-speed bit-slice processor technology.

Designed for two-dimensional mechanical and electrical schematic applications, the Cadmax-I system incorporates a bipolar, bit-slice technology processor that is geared for rapid response and interactive design/drafting tasks. The processor has a basic memory of about 256K bytes, expandable to 2M bytes.

The system can simultaneously support up to 56 workstations, a spokesman claimed.

Cadmax-I has a separate 95-key keyboard used for text entry and a data tablet that enables input of design and drafting commands, a spokesman said.

For data storage, the system has a Winchester disk with a minimum of 25M bytes of on-line storage space. A magnetic tape cartridge unit, supplied as part of the system, maintains a duplicate set of drawing files for archival backup and storage and to communicate drawings to other similar CAD systems, the spokesman noted.

Finally, the turnkey unit has a graphics terminal with a 21-in. vector refresh display.

The system costs $66,200 with production unit deliveries scheduled for the second quarter of 1982 from the firm at the Village of Cross Keys, Baltimore, Md. 21210.

Host of CAD/CAMs Out

(Continued from Page 69)

Computervision's CGP-200X graphics processor is an expansion of its CGP-200 machine. The X model expands the system's physical memory capacity from 1M- to 8M bytes and offers a fourfold increase in the previous system's virtual address space. The newer version also incorporates increased channel bandwidth and on-line disk capacity, a remote diagnostic capability and expanded CPU microcode that is tuned for CAD/CAM applications, the spokesman noted.

Available in the first quarter of 1982 as a field upgrade, the CGP-200X is supplied as part of a complete CAD system and costs from $300,000 to $600,000, or about $25,000 more than a system with the CGP-200 processor.

By expanding its Designer M family of systems, Computervsion is reportedly aiming its CAD/CAM sights at the smaller business environment. The turnkey systems line now includes three different system versions — the Series 20, 30 and 40 — each one aimed at the medium-scale business markets.

The CAD/CAM systems are all basically the same, but differ in that complexity of software and ability to handle extra peripherals and terminals. All of the systems include as standard equipment: a processor with fixed media and magnetic tape drive, the firm's Cgos operating system, two of the firm's Instaview-M terminals, one CAD/CAM software application package and the just introduced P-1000 pen plotter (see below).

To meet future needs, the Series 30 can be field upgraded to a Series 40 and all of the Designer M systems can be upgraded to the more powerful Designer IV and V systems. In addition, Designer M systems can be linked to each other and to larger Computervision systems via the firm's Cvnet and graphics network architecture.

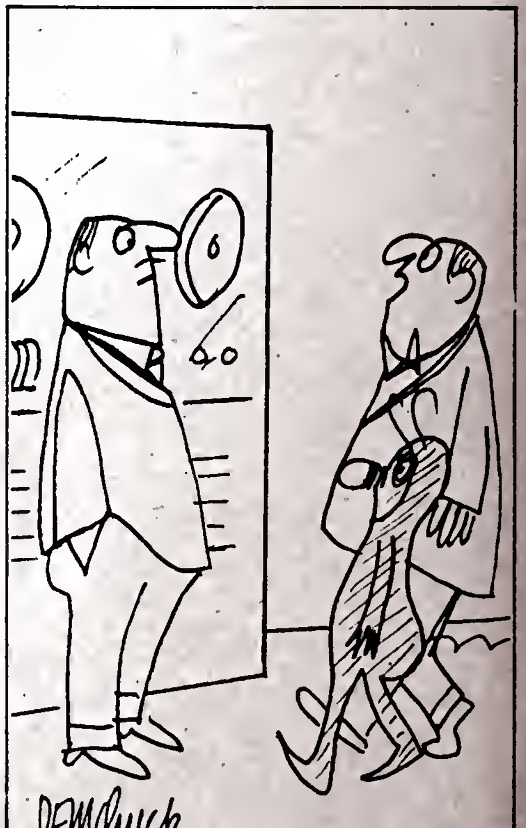
Prices for the M systems range from $100,000 to $230,000 and are based on each user's application, the spokesman stated.

The P-1000 pen plotter is capable of creating drawings up to E-size and can produce continuous plots up to 50 ft long. The unit includes four pens for multiple line widths and colors, automatic feed and take-up for unattended operation, extensive microdiagnostics and a touch-sensitive keyboard and display. The P-1000 costs $38,000.

Other products unveiled by Computervision include a display control unit, which is a high-resolution enhancement that expands the display capabilities of the firm's monochromatic and color raster scan graphic workstations. It costs $5,000 for a monochromatic version and $10,000 for color; Solidesign, a solid modeling software package that costs $60,000 and allows users to define complex three-dimensional parts and structures from solid geometric building blocks as well as lines and surfaces; and a variety of software targeted for the automated factory, the spokesman continued.

Prices for the systems start at about $100,000 and are custom-tailored for each user application.

Computervision is located at 201 Burlington Road, Bedford, Mass. 01945.



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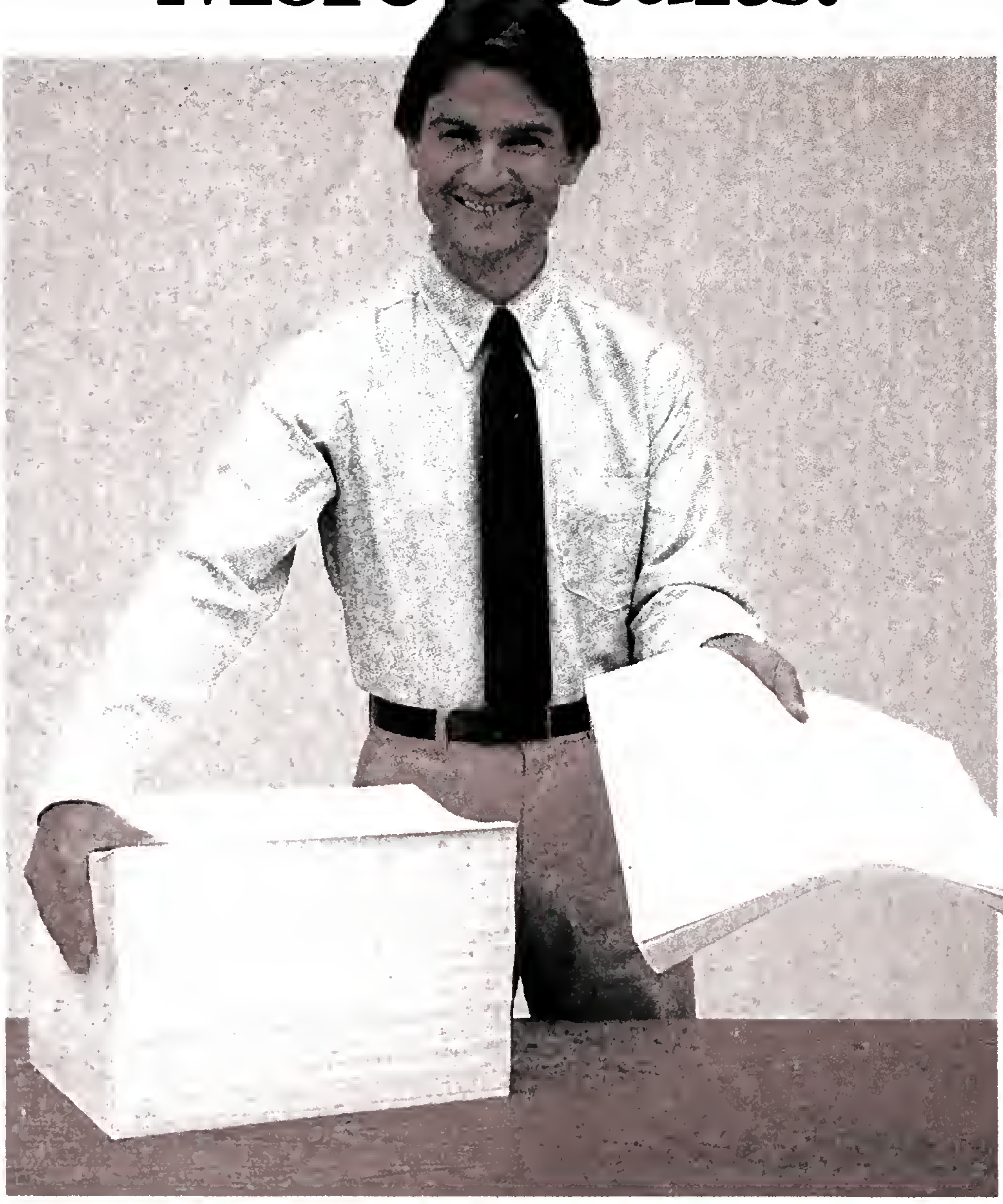

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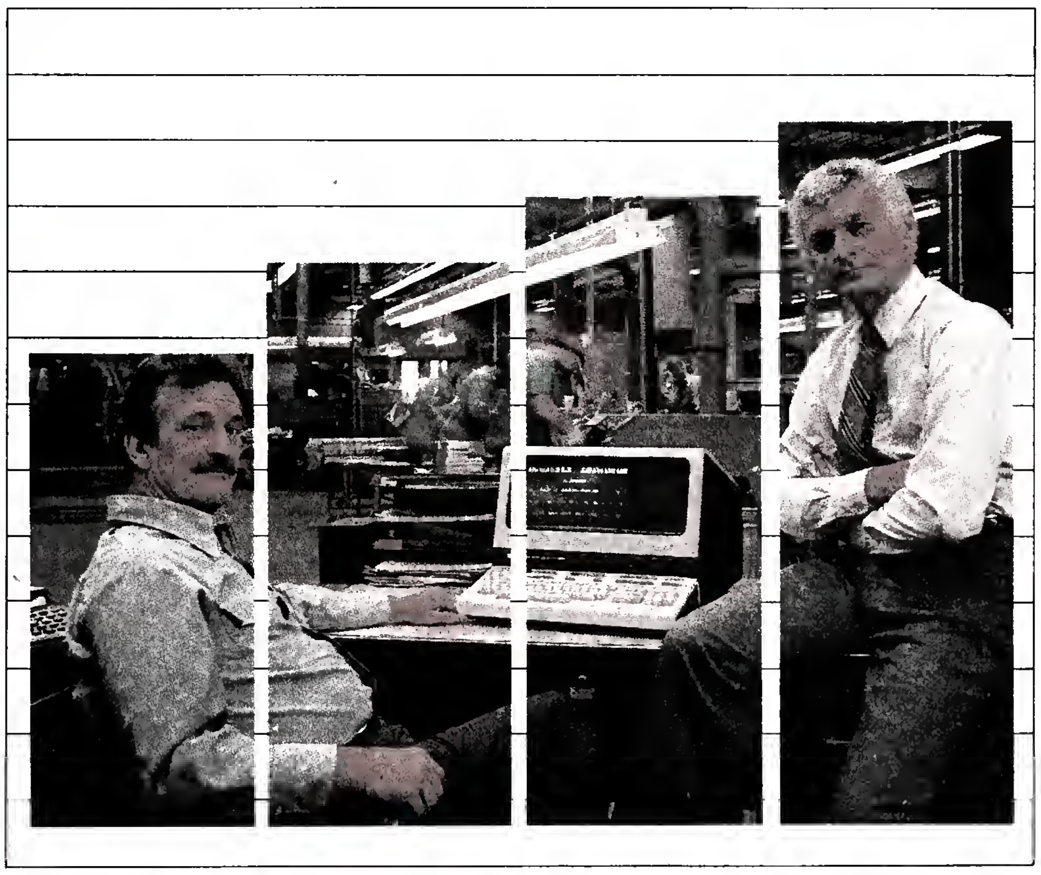

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Unix-Based Mini Aids Application Development

CAMBRIDGE, Mass. — Bolt Beranek and Newman, Inc. has expanded its Unix software-based minicomputer line by introducing a minicomputer for the development of applications programs that offers up to 1M byte of memory and can handle up to 16 users.

The C/60 system, like its predecessor, the C/70, is built around the C language and the Unix time-sharing system.

The C/60 features an advanced microprogrammable architecture that provides a hardware foundation for addressing 1M bytes of memory and is fully programmable with other Unix-based computer systems, a spokeswoman said. The system utilizes programmable 32-bit microwords and an instruction mapper and memory management unit that reportedly allows the system to take full advantage of its 135 nsec cycle speed.

The C/60's intelligent memory management scheme, which is designed for the system's multiuser capabilities, is said to reduce overhead for process switching and performs boundary checking for user protection. The scheme also allows the machine to determine read, write and execute access control over user-specified code segments.

Memory is split into eight maps or segments. As the number of processes increases, parts of the memory become inactive and new segments are called into play, the spokeswoman explained. The maps keep the Unix operating system informed as each segment becomes inactive and is subsequently transferred to disk and returned to active duty.

Processing Time

The C/60 system has a 1K register cache that relieves the processing time it takes swapping and saving registers during function calls; a number of I/O controllers that do electrical level conversions, serial to parallel conversons and buffering; and an IBM-compatible streaming magnetic tape drive for archival storage. Optional peripherals include an 80M-byte storage module disk Winchester drive.

C/60 software support is provided by the Unix Version 7 operating system. Besides the C language, the system can use Fortran 77.

Finally, communications support for the C/60 includes MSG, an electronic mail system and BBN-Net support for file transfer and interactive access.

The system is scheduled to be shipped in January and costs $49,500 for a 256K-byte eight-user configuration. A 16-user system with the same amount of memory costs about $50,300, the spokeswoman said from the company at 33 Moulton St., Cambridge, Mass. 02238.

Turnkey Package Coordinates Components of Product Design

SANTA CLARA, Calif. — Calma Co. announced here a turnkey package that reportedly coordinates the electronic and mechanical aspects of product design.

DDM/PC is said to use a single data base for both printed circuit-board design and mechanical design, drafting and manufacturing. The hardware is based on Data General Corp.'s Eclipse system.

DDM/PC supports digitizing of manual layout, on-line interactive design and design automation, the vendor said. It features automatic conductor routing and component placement.

A grid shift feature is said to give designers using the DDM/PC system an improved fine-line capacity that allows interconnects to be packed as tightly as manufacturing tolerances allow, rather than being limited by the drawing grid.

Calma's DDM/PC system reportedly utilizes an intelligent data base, offering PC designers net list generation, automatic design rule checks, load and drive analysis, on-line circuit checking and network tracing.

The hardware and software is priced at approximately $250,000 and up, depending on the configuration, the vendor said from 5155 Old Ironsides, Santa Clara, Calif. 95050.

CGS-80 Fits Graphmaster

ATLANTA — The Computer Graphics Group, Inc. has announced CGS-80, a microcomputer-based graphics system.

Based on dual Intel Corp. 8080 processors, the system features up to 64K bytes of memory and can use the firm's Graphmaster software. Included in the system is a high-resolution graphics plotter that is capable of displaying up to 4,913 color shades and a CP/M-compatible desktop processor based on the 8080 microprocessors, the firm said.

A complete package including a high-resolution graphics display terminal, a 64K-byte CP/M-based desktop processor, dual 8-in. disk drives, the firm's CGS operating system and Graphmaster costs $9,950, the firm said from 568 14th St. N.W., Atlanta, Ga. 30318.

Honeywell DPS-6s Get Memory Board

SANTA ANA, Calif. — Trendata Corp. has announced an add-in memory board for Honeywell Corp. DPS-6 processors.

Called the Pincomm H6, the modules provide 64K bytes of storage and are offered with 22-bit error detection and correction. The boards are compatible with Honeywell's DPS 6/30, 6/32, 6/34, 6/38, 6/48, 6/54 and 6/8 processors, the vendor said.

The error detection and correction boards cost $720, the vendor said from 3400 W. Segerstrom Ave., Santa Ana, Calif. 92704.

Mini Bits

Altos 8000-2, 8000-15 Prices Cut 20%

SAN JOSE, Calif. — Altos Computer Systems, Inc. has reduced the price by nearly 20% on its 8000-2 and 8000-15 Z80-based microcomputer systems.

Effective immediately, a Model 8000-2 system with 64K bytes of memory and a 1M-byte dual floppy disk drive costs $3,650, down from $4,500. In addition, a 208K-byte Model 8000-15 system with 1M-byte of Winchester disk storage has been reduced from $5,990 to $4,990.

Prices were dropped to compete more effectively in the microcomputer marketplace, a spokesman said. Altos is located at 2360 Bering Drive, San Jose, Calif. 95131.

Unit Ties Printers to Decsystem 20s

FORT LAUDERDALE, Fla. — Southern Systems, Inc. has announced a printer controller that allows up to seven line printers to be attached to Digital Equipment Corp. Decsystem 20 processors.

Called the S-20, the controller is both hardware- and software-compatible with DEC's 2020, 2040, 2060 and the 1091 processors, the vendor said.

Subsystems cost between $10,000 and $36,000, the vendor said. More information is available from Southern Systems, 2841 Cypress Creek Road, Fort Lauderdale, Fla. 33309

Boards Run With PDP-11, LSI Gear

SANTA CLARA, Calif. — National Semiconductor Corp. has introduced two memory boards for Digital Equipment Corp. processors.

The NS44F is a 512K-byte board for PDP-11/44 processors and features error correction and 64K bytes of random-access memory. It costs $3,999.

The NS23M offers 256K bytes of add-in memory for Q-Bus series LSI-11 processors, the LSI-11/23 and the PDP-11/03. It can reportedly replace the DEC MSV11-D and costs $1,020/card for a 128K-byte depopulated version and $1,505/card for a 256K-byte fully populated board. National Semiconductor is at 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

Interfaces Target DEC, DG Users

FRAZER, Pa. — Cardmation Co. has announced interfaces to connect paper tape readers and punches to Digital Equipment Corp. and Data General Corp. minicomputers.

Members of the Cardmation 1300 line, the 1311 controller is available for DEC's PDP-11 line, the 1321 for the LSI-11 line, the 1308 for DEC's PDP-8 and the 1351 for DG's Nova.

Each includes a controller board that plugs into the CPU chassis and a 15-ft interface cable. Each interface can accommodate fan-fold and reel-type paper tape models. The interfaces cost $550. Complete subsystems are also available. Cardmation can be reached through Box 746, Frazer, Pa. 19355.

Board for LSI-11 Adds 256K Bytes

TUSTIN, Calif. — Professional Data Systems, Inc. has introduced a 256K-byte memory board for Digital Equipment Corp.'s LSI-11/23 computer that features 64K-bit random-access memory chips.

The memory, which is fully DEC-compatible, has a two-layer printed circuit board construction and addressing that is switch-selectable in 32K-byte blocks. The unit has an access time rated at 150 nsec, the vendor said.

The board costs $1,200 from the firm at Suite C, 2670 Walnut Ave., Tustin, Calif. 92680.

Plug-In Memory Targets DEC Users

HOUSTON — Computer Extension Systems, Inc. has announced a plug-in memory module for Digital Equipment Corp. LSI-11 and PDP-11/03 processors that has on-board refresh, on-board parity generation and checking and a 22-bit addressing capability.

Model VML 1132P is compatible with all LSI-11 and PDP-11/03 processors, the firm said. However, the unit's 22-bit addressing capability is compatible only with LSI-11/23 and PDP-11/23 processors.

The VML 1132P costs $450 from the firm at 17511 El Camino Real, Houston, Texas 77058.

H-25 Prints Up to 300 Line/Min

BENTON HARBOR, Mich. — Heath Co. has announced a bidirectional dot matrix printer, the H-25.

The unit prints at 150 char./sec and up to 300 line/min. It interfaces with most minicomputers using a standard RS-232C serial interface or a 20 mA current loop. It employs a 95-char. Ascii character set with 33 graphics characters, the vendor said.

The unit costs $1,095 from Heath, Department 350-315, Benton Harbor, Mich. 49022.

Sports Medicine Firm Scores Goal With MPU For Accounting, Sales

FORT LAUDERDALE, Fla. — A sports medicine firm here has zapped its inventory problems by sidelining its service bureau and fielding a minicomputer.

Casco U.S.A., Inc. designs, manufacturers and markets a line of protective and therapeutic equipment that includes ankle wraps, rib guards, finger splints and cold jell. "Eighty percent of all athletic injuries are preventable. Suitable equipment, the use of protective devices and sufficient warm-up exercises will eliminate the potential for most injuries and, at the same time, will minimize the severity of those that do occur," according to Allan P. Barron, former N.Y. Jets football player and now Casco U.S.A. vice-president.

Corporate planning to accommodate present product demand and to prepare for future growth was an area of concern to the company. "Our ability to react to day-to-day business and to develop future projections was seriously hampered by the lack of hard data from our service bureau. For example, having to make decisions on the basis of month-old receivables data was not acceptable. Our only viable alternative was to go with an in-house computer, providing that it could be brought on-line within a reasonable time frame and could be cost-justified," he said.

Casco U.S.A. replaced the service bureau with a Minicomputer Systems, Inc. (MCS) Micos system with 64K bytes of memory, six on-line terminals, a Micos 200 CPU and a 30 line/min printer. MCS software packages selected include inventory management, order processing and billing, sales analysis, accounts receivable, general ledger and application programming tools, he said.

Besides using the computer for accounting functions, Casco U.S.A. intends to use it to build sales. "For example, we can utilize our data base to develop customer lists for direct-mail programs," Barron said.

Software installation, package testing and employee training consumed three months. Upon completion of the testing stage, the system was ready for live operation.

"We installed the packages one by one and ran it parallel with the service bureau to test the validity of the data. During the test phase, our employees received 'hands-on' training with each module. We began testing in March and went live in May. This module-by-module approach gave us more control of the testing and operation of the system," Barron explained.

"If the computer can tell me that a doctor, for example, averages one dozen ankle wraps monthly, I can contact the customer and inquire whether he would like us to automatically ship this quantity to him each month. Not only can the physician utilize his time more productively, but the computer will automatically process both the order and the bill each month," according to Barron.

Public School Market

Merchandising of the Casco U.S.A. product line to most distributors and end users is routinely handled by the sales staff. Marketing to public schools, however, is a vastly different operation. Because there are many thousands of school districts in the U.S., each requesting bids at different times during the year, ensuring the appropriate bid is received by the specific district at the proper time is a formidable task, Barron said.

"Each and every school district — and its bid date — in the U. S. will be ultimately entered into the computer's data base. The computer can then output data to prompt us to submit the appropriate bid at the appropriate time," he noted.

Although the company's future looks bright, it might prove to be difficult to duplicate its current growth rate. "Our original projections indicated that the processor would give us the capability of increasing sales by 50% within one year. Actual figures, though, indicate that we've achieved this goal in just three months," Barron said.

Workstation Runs Solo Or On-Line

ALBUQUERQUE, N.M. — The RCO Corp. has announced a Z80-based workstation that can operate either as a stand-alone processor or as an on-line terminal to a host processor.

The AOS/VC contains two Z80 processors, a 24-line display with 80- or 132-char. options and 1.2M bytes of disk storage in dual 5¼-in. floppy disk drives. It contains 128K bytes of random-access memory and can be used as an intelligent terminal on various vendor's processors, the vendor said.

The workstation can operate as a stand-alone unit under CP/M or under Basic Four Corp.'s Business Basic.

The AOS/VC costs $5,995. The vendor can be reached through P.O. Box 8350, Albuquerque, N.M. 87198.

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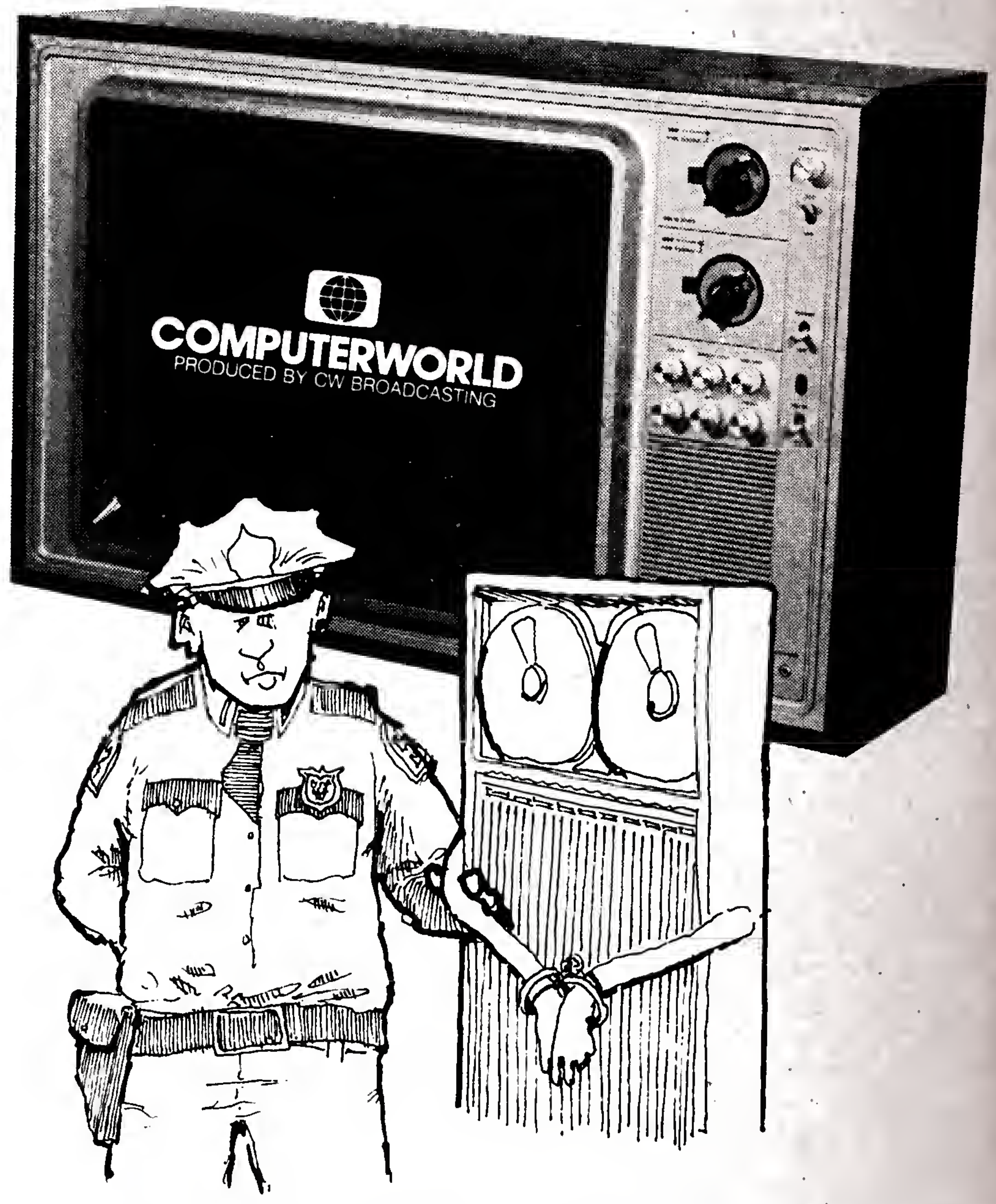

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Philadelphia	WTAF	29	Mon	10:30 PM
Allentown, PA	WFMZ	69	Sun	6:00 PM
Boston	WLVI	56	Sat	11:30 AM
Washington, DC	WDCA	20	Sat	12:00 Noon
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PRODUCED BY CW BROADCASTING

This week, *Computerworld's* cameras travel from one end of the country to the other to explore the emerging use of computers in prisons. At the Walla Walla State Penitentiary, authorities have bent the rules to allow one inmate to pursue his creative dreams. With a microcomputer in his cell and plenty of time on his hands, this prisoner is deeply involved with systems development. Meanwhile, back on the East Coast, a major U.S. corporation is working with inmates at Norfolk County Prison to train inmates in Cobol programming so that they will be able to get a decent job when they are released. You'll see how the program works, from the inside out.

Join us this week for another fascinating look into the world of computers and their effect on our society. The current schedule of stations and times is shown. (Be sure to check it each week, as we often change stations or times to provide broader coverage to more people.) If you don't live within range of one of our broadcast stations, you may be able to get us on cable, on "superstation" WOR, which is available in more than 5 million cable homes around the country.

If *"Computerworld"* isn't part of your regular weekly TV schedule, please join us this week.

To Fight Critical DP Shortages

Firms Try 'Golden Handcuffs' to Fill Jobs

By Robert Batt
CW West Coast Bureau

SAN FRANCISCO — New buzz words representing developments in the computer industry are not remarkable in today's fast-growing technological environment. However, one piece of jargon is beginning to attract growing interest from DPers on the lookout for improved career prospects — "golden handcuffs."

Facing a critical shortage of skilled technical personnel, companies competing in a sellers' market are going overboard as each attempts to sell its organization as the one to join. The result is the emergence of what has become known as the golden-handcuffs market.

Vendors and users desperate to overcome their shortages of skilled staff are coming up with bigger and better executive compensation packages than ever before. Take, for example, a recent advertisement in *Computerworld* from Standard Oil Co. of Ohio. In its quest for a telecommunications technology consultant to formulate strategic planning, the company offered a relocation package that, for the successful executive, included a mortgage interest differential allowance, a third-party home purchase option and "other features normally restricted to internal transfers."

Apart from a salary increase to go with the increased responsibilities, "other features" being offered by many companies include an up-front cash sign-on bonus, company stock options and possibly even specially built housing.

"Middle-management executive placement in the past few years has shown that companies in growth areas like the computer industry cannot afford to make talent trade-offs by not offering enough compensation and expect to grow," according to Herb Sokol of RW Consultants, a New York-based executive search firm.

Sokol claimed that although the idea of cash bonus incentives for middle managers is still new to many companies, there is evidence of its growing popularity. As an example, he cited a Midwest peripherals equipment manufacturer — part of a multibillion-dollar corporation — that recently offered a mechanical design engineer with only two years' experience a $30,000 package, including a $2,000 sign-on bonus.

In another instance, a start-up West Coast peripherals company offered a materials manager a $50,000 package, including $8,000 in incentive compensation, to make a lateral move from a $33,000 position at a larger firm.

"When we consult with clients about offering cash bonuses to attract or retain a middle-management employee," Sokol noted, "they must consider the cost of either not hiring a needed person or of losing and replacing a valuable employee."

Considerations of this kind weigh heavily on human resource managers charged with the responsibility of overcoming the acute manpower crisis that has afflicted the DP industry for several years. For example, despite the fact that there are now in the U.S. 300,000 programmers working

(Continued on Page 80)

Housing Costs Seen Halting Influx of DPers

By Robert Batt
CW West Coast Bureau

TORRANCE, Calif. — Industrialists in California's high-technology community are desperately worried about the reputation the state has earned for astronomical living costs, particularly the price of housing.

J. Paul Sutton, president of Gemini Management Resources, Inc., a Los Angles-based consulting firm, warned at a recent conference in San Francisco that the situation is getting out of hand.

"The inability, for instance, of senior engineering and engineering management professionals from out of state to buy adequate homes here is already inhibiting the technical development and production growth of the aerospace and electronics industry in California," Sutton said. He added that if proper staffing in these categories was not accomplished, the growth of these industries could be seriously reduced or become flat.

Study Planned

In response to this threat, nine major aerospace and electronics companies in the South Bay area of Los Angeles County decided to take matters into their own hands. In cooperation with the Torrance Chamber of Commerce, the companies initiated a project to examine the possibility of providing housing to new and existing employees. The study is scheduled for completion early next year.

"Land values in this region are so high we have to have some form of high-density housing if we are to solve the problem," Don Page, a member of the Torrance Chamber of Commerce, said. "High technology will be forced out of this area if we do not get to grips with the problem."

The idea of the consortium is to devise a community project that would place key employees into houses at prices they can afford. "First of all, we need to know what type of housing will sell to the type of people we have in mind," Page said.

Faced with land prices of between $7- and $15/sq ft, the question is how to keep the cost of housing down. One scheme being considered is that of a leasehold operation where the land is owned by a foundation and is leased to the buyers to build houses on. For those who want to own the land outright, there could be an option to buy the lease after a certain time period.

Whatever solutions are reached, it is clear both employees and data processing and other technical professionals are concerned about the barrier California housing prices pose to their career prospects. Each month, one company in the Los Angeles area holds an after-hours seminar on this topic.

Should the Torrance plan get the go-ahead, it is sure to be watched by other areas with similar problems, such as Silicon Valley and the San Fernando Valley, with a view to implementing such a scheme in those localities.

Export Redraft May Cut Tech Flow to USSR

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Halting the diversion of U.S. technology to the Soviet Union will be a cornerstone of the emerging export policy, Reagan administration officials who are redrafting export regulations told Congress recently.

Assistant Secretary of Commerce Lawrence J. Brady said "One of the highest priorities of the Reagan administration is to establish a consistent and predictable East/West trade policy, which will take into account the security, foreign policy and economic conditions which exist today."

Telling the House Foreign Affairs Subcommittee on International Economic Policy and Trade that "the American business community was justifiably upset" with past policies that had no clear guidelines and that led to lengthy delays in processing export license applications, Brady noted the backlog of applications has been dramatically reduced over the past months [CW, Nov. 16].

The U.S. is preparing a new list of critical technologies subject to export control and, with business community advice, is drawing up new export guidelines while at the same time stepping up enforcement operations, according to Brady, who is in charge of the Commerce Office of Trade Administration.

National Security Controls

Concerning the diversion problem, Brady said "Our policy on national security controls toward the Soviet Union will strengthen export controls on high technology (process know-how, including technical information) and certain critical equipment, which can upgrade Soviet production with respect to its defense industries."

He promised closer consultation with U.S. allies to develop a consistent Western export policy toward the Soviet Bloc. The U.S. will continue to differentiate between the Soviet Union and other Eastern European nations in terms of export control. "The most critical element of that differentiation policy is the question of diversion," Brady explained.

Under fire from Congress over recent revelations of high-technology diversion to the Soviet Union, the administration has increased its enforcement program, according to Brady, who said the government seized 128 illegal shipments during fiscal 1981, twice the number seized the previous year. The 1982 budget provides for additional staffing of export administration compliance offices.

In January, two new compliance offices will be opened in Los Angeles and San Francisco because of the heavy concentration of high technology in those areas. Approximately 25% of the enforcement activity is on the West Coast,

(Continued on Page 84)

10,000 Potential Sites

Vitalink Enters Satellite Earth Station Arena

By Robert Batt
CW West Coast Bureau

MOUNTAIN VIEW, Calif. — The announcement of its Data Trac I digital satellite earth station (see Page 65) represents Vitalink Communications Corp.'s first entree into this fast growing field.

The field has been dominated by well-financed companies such as Satellite Business Systems (SBS) and Nippon Electric Co. (NEC) of Japan, but Vitalink believes it has taken a technological lead in satellite data communications.

According to the company, which was formed just more than a year ago, there are around 10,000 potential sites for Data Trac alone over the next five years.

Albert Horley, Vitalink's president, told *Computerworld*, "Much of what we are doing is similar to what SBS is offering, but at a much lower price, [around $75,000]. For example, a company that could afford four SBS sites might be able to afford up to 100 of ours, given the technology we are using."

Split Market

The market for satellite earth stations is split up between two-way communication facilities and broadcast or distribution services. Vitalink plans to compete in the first of these markets, concentrating in particular on data networks. The company's aim is to bring together satellite broadcasting technology, switching techniques and matching protocols into a single package.

"To this point no one has created a network of satellite data communications. Instead they have created point-to-point links," Horley explained. "But communications bills have grown to a point where they have now exceeded computer bills, and so it has become a matter of urgent policy in many top corporations to look for big throughput facilities and reduced error rates where the real economic savings are to be made."

By offering much higher throughput rates in distributed data processing services, the company intends to compete against the postal telephone and telegraph and telephone carriers, which have traditionally dominated the area.

Horley, himself a former director of communications policy at the now defunct Health, Education and Welfare (HEW) Department, has concentrated on standardization and mass production in order to reduce costs.

"We aim to use packet switching to cost-effectively use space segments, which are expensive and at the same time make the system transparent to its various users. The object is to make it look like and act like a piece of business machinery," Horley explained.

Two Types

According to Vitalink, two types of applications are most suited to this technology:

- Mainframe-to-mainframe computer communications in which the computers provide the switching facilities. In this sense, Horley said, the earth station would simply be a peripheral to the computer in the same way as a disk file now is.

"The earth station literally becomes part of a computer and you could have a controller for the satellite network. We think we have done some interesting things in terms of packaging, such as putting all electronics onto the satellite antennae so that no single failure, including the shutting down of the satellite, can bring the system down," he said.

- Local networks. Here the earth station presents itself as a terminal to extend the network to other locations and interconnect them through satellites so that it acts almost like a modem. In this fashion it is envisaged that networks could talk to earth stations, which in turn could talk to other networks such as Ethernet.

Vitalink has already had talks with two local-area network manufacturers — Zilog, Inc. and Ungermann-Bass, Inc. about attaching their networks to the Data Trac system.

Emphasizing the modular nature of the system, Horley added: "Given the technology we are using, we feel we have established a lead in this field. The advantage to our users is that they don't have to presuppose some new application to take advantage of the products."

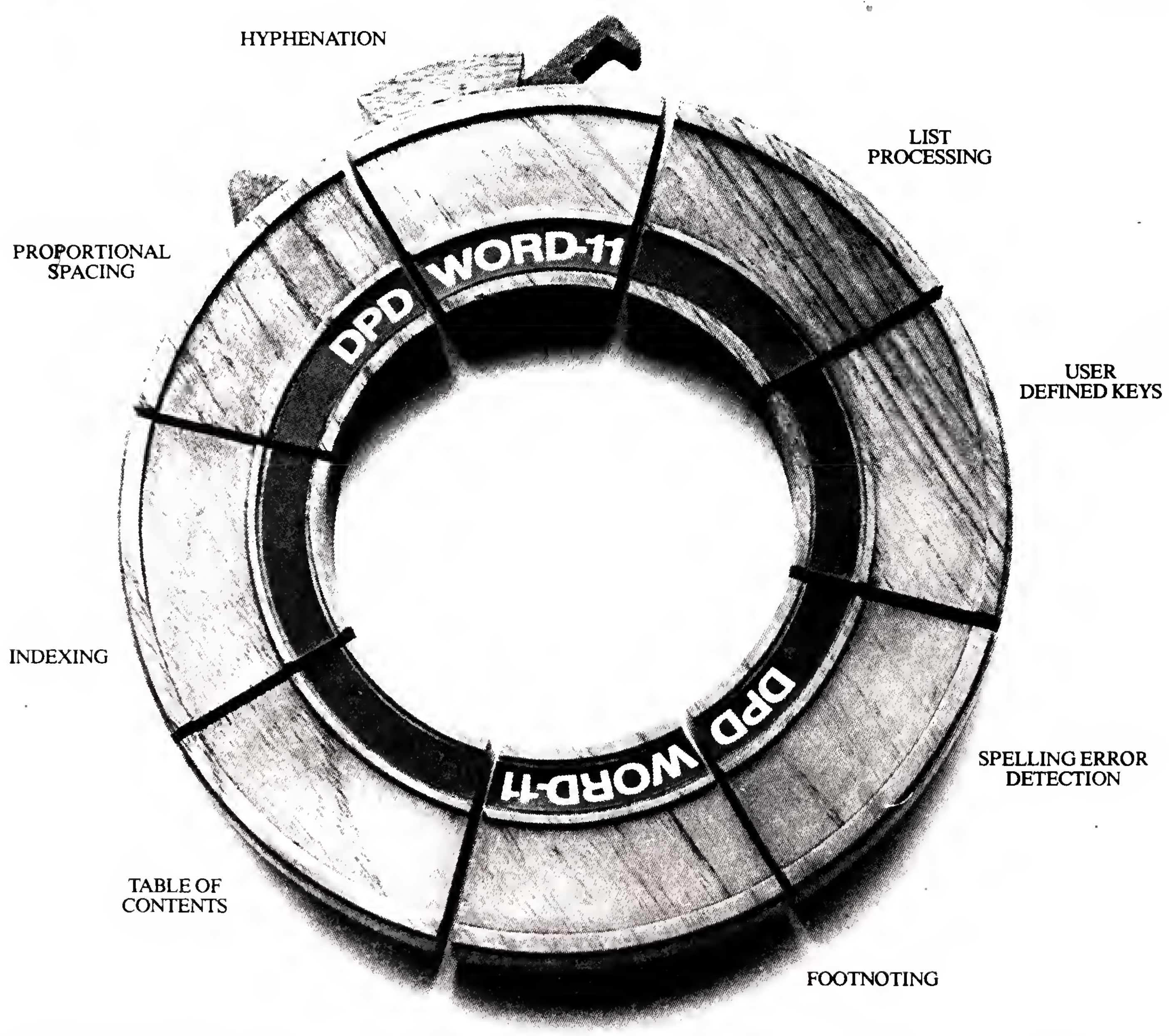
Court Grants Intel 60-Day Extension

SAN FRANCISCO — Itel Corp. has won court approval on its fourth request for a 60-day extension period in which to file a plan of reorganization with the court.

Itel also received the right to maintain plan exclusivity for an additional 60 days, in order to solicit acceptances of the plan filed during the first exclusive period.

Chairman James Maloon stated that the company is nearing agreement on the major elements of a consensual plan of reorganization.

The Whole Truth About PDP-11 Word Processing.



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Report Finds High-Tech Rewards Reflect

By Robert Batt
CW West Coast Bureau

NEW YORK — More and more high-technology companies are adopting strategically coordinated executive compensation plans to attract top talent. So states a recently published report by the Hay Group, a management consulting firm based here.

The report, which is the result of a nationwide survey of 75 companies ranging in size from $50 million to $1 billion, said stock options are now the cornerstone of long-term company incentive programs.

Key findings included:

- Stock appreciation rights are becoming more common in larger firms, where the impact on earnings and cash flow is less significant.
- Increasingly, small high-technology firms are adopting restricted stock plans. Such plans typically involve direct stock grants that vest over three to five years.
- Larger high-tech companies, following the lead of billion-dollar firms, have begun to use performance unit plans linking individual bonuses to strategic goals and the direction of the enterprise.

According to the report authors, David McLaughlin and Mark Edwards, the recent elimination

'Golden Handcuffs' Lure Skilled Personnel

(Continued from Page 77)

and another 300,000 who work part-time on software, the demand of highly skilled people to write software has been estimated at 40% greater than the supply.

Concurrently, there has been a growing immobility among members of America's managerial classes, who are no longer so willing to drop everything in Pittsburgh, for example, for a promotion in Los Angeles. In California, in particular, the cost of housing is proving a major deterrent to attracting the right technical people into the state.

"Given the critical housing situation in the Bay area, we expect to see a drift of production facilities out of Silicon Valley because people are not being adequately compensated for the increased cost of housing here," a spokesman for San Francisco consultant Robert Half said.

As part of an executive compensation package to deter this kind of thing, nine major aerospace and electronics companies in the Los Angeles area have formed a consortium. The idea, if it comes to fruition, is to build housing centers, along with recreational and greenbelt areas, which would be appropriate for the companies' middle managers, engineers and technicians in the $25,000 to $45,000 annual salary range.

The rationale for such a move was explained by J. Paul Sutton, president of Gemini Management Resources, Inc., a Los Angeles-based recruitment specialist.

"There are not enough professionals within California to fill all the technical jobs and most frequent objection of DP managers living outside the state is that they cannot afford a home appropriate for their positions. The homes which they can afford do not generally conform to the California life-style which they have envisioned."

More Schemes

In attempting to deal with these kinds of problems and frustrations, companies are coming up with more and more ingenious golden handcuffs. Direct bonuses (sometimes of up to 10% of annual salary for three to five years), payment of interest differentials to cover the cost of moving into a more expensive region and equity sharing based on payment by results are just some of the schemes now being worked on.

Lee Schweichler, vice-president of Winguth, Varco and Associates, a San Francisco-based executive search firm, sees this trend continuing as executives search around for the right deal. "Over the last two years, people have become much more sensitive to themselves and their own needs," Schweichler said. "They are taking a more analytical approach to benefits."

Wrap-Up 1981 and Look Into the DP/MIS Future in Computerworld's "Review And Projections," Our December 28/ January 4 Special, Combined Issue.

Computerworld's reporters are hard at work bringing together the major events of 1981 and giving you a look into the future of the computer industry. In "Review and Projections," you'll read about information systems technology and the people who make that technology work. Here are some of the important topics we're presenting:

- Personal computing within the large business environment
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And that's not all. You'll also be getting in-depth coverage on:

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of the qualified stock option has made nonqualified stock options more attractive. "Now with the passage of the Economic Recovery Tax Act (Erta) of 1981, which introduced the incentive stock option, it is clear this heavy emphasis on options will continue," they said.

Following the passage of Erta, Edwards said, they expect to see more types of executive compensation plans made available to key executives, particularly for those who have a direct impact on a company's performance, such as a senior technical director.

Under the new tax laws, incentive stock options (ISO) are available. This is a new tax-qualified stock option that provides to employees an opportunity for capital gains treatment similar to that previously applied to qualified and restricted stock options.

Multiple Plans

The report makes clear, however, that while ISOs will be used broadly to attract new personnel, they will not supplant all other types of plans.

"Perhaps the most significant finding to emerge from the survey was the growing prevalence of multiple plans in all size companies," the report says. "Because of the inherent advantages and disadvantages of any one long-term incentive vehicle, a growing number of high-technology companies are adopting two- and three-part plans."

This development, the authors claimed, enables firms to create a tandem or dual program at the upper level rather than rely solely on stock options. It also allows them to target unique plans for specific employee groups. "One pattern we have seen in our consulting work is restricted stock for engineering and software professionals and performance unit plans for the top 10 to 15 senior executives," the report states.

'Tiered' Effect

Multiple plans help create a "tiered" effect in the executive compensation program so that key personnel are eligible for additional plans at successively higher responsibility levels. "Companies are very concerned about holding on to their key knowledge people," Edwards added. "If they were to lose these people it could push back production six to 12 months and who knows what that means, given today's intense competition."

The report says that the pace of high-technology start-ups has put more pressure on stock plan practices. In California, which has experienced more new venture competition and where the price of housing has created unusual hiring patterns, the small to medium-size public companies have been forced to be innovative to attract and hold talented people, the report adds.

The report concludes: "In our opinion, incentive programs for middle management will be a central compensation planning issue over the next few years. These individuals have been heavily impacted by inflation, and promotion opportunities have slowed in many companies. Middle management incentives are critical to productivity improvement and cost control."

There's a Catch to This Plan

Restricted stock grants are gaining in popularity as a way of rewarding successful middle management in high-technology companies. Stock is usually granted on a discretionary basis and some companies even give employees cash bonuses to cover the tax implications.

In a typical stock grant, an employee is told he will be given, say, 600 shares of company stock for the fiscal year. However, he is allotted only one-third of the stock beginning the following year.

During the second year, another allocation of shares may be granted to the employee under the same rollover provision, the only requirement being the executive's continued employment — this is why such schemes came to be known as "golden handcuffs."

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*Among independent 3270-compatible equipment suppliers, according to International Data Corporation.

Executive Corner

- Gerald Babb has been named vice-president of market development at Pencept, Inc.
- Michael P. Smith has joined Software Dimension, Inc. as vice-president of finance and administration.
- Transnet Corp. has appointed two new vice-presidents: Robert P. McCarthy, who will be in charge of all the company's computer stores, and Steven J. Wilk, who will be responsible for administration.
- Thomas Kingree has joined Computer Technicians, Inc. as executive vice-president.
- Jerald Gingold has been appointed vice-president of manufacturing at Sendex Corp.
- Richard J. Litschgi has been appointed vice-president of software development at Honeywell, Inc.'s Large Information Systems Division in Phoenix.
- Graner Thorne has been named vice-president and general manager of the OEM Data Products Division of Siemens Corp.
- Piers L. Curry has been named to the newly created post of vice-president of development programs at GTE's Corporate Development Division.
- Fred Bledsoe has been promoted to vice-president of quality assurance at ITT Courier Terminal Systems, Inc.
- Bob Wolkowicz, former director of national sales at Lear Siegler Data Products Division, has been named vice-president of sales and marketing at General Terminal Corp.
- Molecular Computer of Molecular Logic Corp. has named James F. Schofield marketing vice-president.
- Michael Lanagan has been appointed vice-president of marketing at Florida Computer Graphics, Inc.
- Datapoint Corp. has elected Edward Gistaro executive vice-president in charge of finance and corporate development and Daniel Hosage to the new position of executive vice-president of international operations.
- Electronics Processors, Inc. has appointed Robert Derschang executive vice-president.
- James Dillon has been elected vice-president of manufacturing at OSM Computer Corp.
- Bradley O'Brien has joined the Perspective Telecommunications Group as vice-president in charge of research.
- John J. Dougherty has been appointed president and chief executive officer at Molecular Computer, a division of Molecular Logic Corp.
- Craig S. Hill has been named president of Cortex Corp.
- Michael J. Timbers has been appointed president of Information Handling Services at Indian Head.
- Deborah H. Gauer has been promoted to vice-president of consulting services for Communications Technology Management, Inc.
- James E. Pruitt has been elected vice-president, group executive, in charge of Harris Corp.'s printing equipment group.
- Tres Systems, Inc. has appointed Terence D. Jung vice-president of finance, secretary and treasurer.
- Stuart C. Johnson has been named vice-president of product marketing for the business machines group at Burroughs Corp.
- John H. Trollman has been named vice-president of finance for Dest Corp.
- John F. Bizjak has been appointed vice-president of systems at Locom Corp.
- Merritt M. Lutz has been named software products group vice-president at Informatics, Inc.

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COMPUTERWORLD
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Supershorts

Dataforce International, Inc., a Panamanian corporation, announced that the spin-off of its subsidiary, Data Equipment, Inc., has been delayed due to lack of an exemption for trading of the stock shares.

— — —

Instrumentation Laboratory has formed a new group called the Pixel Division to design, manufacture and market high-performance multiuser microcomputer systems.

— — —

Apple Computer, Inc. has formulated a new policy to maintain and improve consumer service and support. Under the new plan, Apple dealers will be required to sign contract modifications in which they agree not to engage in any mail order sales of Apple products.

— — —

Southern Data Services, Inc. has voted to change its corporate name to SouthTrust Data Services, Inc., in order to more accurately reflect its affiliation to its parent company, South Trust Corp:

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Contracts & Pacts

Prime Computer, Inc. has signed an agreement with Ragen Precision Industries, Inc., under which Ragen's 1010 Information Management Systems will incorporate Prime 50 Series 32-bit computers.

Plessey Peripheral Systems has been awarded a $2.5 million contract by RCA's Government Systems Division to supply front-end data communications equipment for the Postal Service's Electronic Coputer Originated Mail (E-COM) service.

Kennedy Co. has won three unrelated contracts totaling over $1 million for its tape transports, formatters and Winchester disk drives. The orders came from Western Electric Co., Integrated Business Computers, Inc. and Card Key Systems.

Malibu Electronics Corp. has signed a contract to supply approximately 500 dual-mode 200 bidirectional dot matrix printers to Turnkey Systems Corp. of Miami.

Avant-Garde Computing, Inc. reported that North American Corp. of New York has agreed to buy up to $15 million of Avant-Garde's Net/Alert communications network monitoring systems.

STSC, Inc. has been awarded two contracts totaling almost $2 million by the Navy Regional Contracting Office of Long Beach Calif.,to provide APL Plus Time-Shareing Service to the Navy's Manpower and Materials Analysis Centers.

Memorex Corp. is supplying its Model 101 8-in. rigid disk drive to Zenith Data Systems Corp. under an 18-mo., $5 million contract.

General Automation, Inc. has reached an agreement with Rolfe Associates, Inc. to acquire and market the Rolfe Trac 80 factory systems application software.

Codex Corp. has had its contract renewed with the Defense Commercial Communications Office for the Channel Packing Program that Codex designed, installed and continues to maintain.

Sanders Associates, Inc. has received an initial $7.9 million of an overall $47 million contract from the U.S. Navy Electronic Systems Command for the full scale development phase of a rapidly deplyable surveillance system (RDSS).

Nickels $ Dimes

Wang Laboratories, Inc. has filed a registration statement with the securities and exchange commission for a proposed issue of $100 million of convertible subordinated debentures, due in 2006.

$ $ $

Amdax Corp., a producer of broadband coaxial cable communications networks, has completed $5 million in new financing.

$ $ $

Tandon Corp. has filed a registration statement with the Securities and Exchange Commission covering 1.8 million shares of common stock.

$ $ $

Universal Semiconductor, Inc. has received more than $3 million through an all-equity agreement with a group of venture capital investment firms and private investors.

$ $ $

Adaptec, Inc. has received $1.7 million initial funding for its start-up. The first product to be developed by the company will be an intelligent LSI Winchester disk controller.

$ $ $

Threshold Technology, Inc. announced the completion of previously delayed financing arrangements, totalling $2 million in loans and equity funding.

$ $ $

Scientific Software Corp. has announced a three-for-two split of its common shares of stock to shareholders of record Nov. 19.

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Lexidata Corp. has filed a registration statement with the Securities and Exchange Commission covering a proposed public offering of 1,500,000 shares of common stock. It is expected to sell at between $13 and $16 per share.

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Advanced Programming Techniques	12/2-4	1/18-20	2/1-3	3/8-10				
CAD/CAM: A Management Overview			12/7-8 3/22-23		1/25-26			2/24-25
Computer Operations Management			12/14-16 3/15-17	2/8-10		1/18-20		
Computer Performance Measurement & Capacity Planning	12/14-18 3/22-26	1/25-29	2/1-5			12/7-11(M)		
Data & Site Security			2/17-19			3/31-4/2		
Data Base Administration & Control	2/1-3	1/18-20	3/15-17		3/29-31			12/7-9
Data Base Concepts, Structures & Access Methods	2/22-24			12/7-9 1/25-27			3/22-24(D)	
Data Base in a Distributed Processing Environment	1/25-27		12/7-9 3/22-24		2/22-24			
Data Communications: Components, Systems & Networks	1/20-22		12/7-9 3/9-11		2/17-19	12/1-3(M)	12/16-18(O)	
Data Communications Network Design	1/26-28	3/2-4	2/2-4					
Data Communications Software	2/8-10	1/25-27	3/1-3					
Data Dictionary/Directory Systems	2/4-5	1/21-22	12/3-4 3/18-19					
Distributed Processing — A Practical Guide	3/24-26		2/24-26			12/9-11		
EDP Operations: Effective Practices & Procedures	3/8-10	2/8-10	1/20-22			12/16-18		
Effective Management of Programming Projects			12/14-18 3/8-12	2/8-12	1/25-29			
Effective Writing for DP Professionals	12/7-9 3/1-3	2/8-10	1/25-27					
Management Control of EDP Costs			12/17-18 3/18-19	2/11-12		1/21-22		
Microcomputers in the DP Environment		1/25-27	2/17-19		3/15-17			
PASCAL Programming Workshop		2/17-19	1/25-27	3/22-24		12/14-16(A)		
Software Quality Assurance		3/24-26	2/24-26	12/15-17			1/13-15(D)	
Structured Analysis & Design	12/9-11 3/10-12	2/10-12	1/27-29					12/2-4
Structured Programming Workshop	12/7-11		2/8-12					
Structured Testing		1/20-22	12/2-4 3/3-5	2/3-5				
Systems Analysis and Design Workshop		2/8-12	1/25-29	3/8-12				12/14-18
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Inventor Licenses Info Patents to IBM

ARMONK, N.Y. — Inventor Jerome H. Lemelson has granted IBM a nonexclusive license to his patents in the field of information handling.

The agreements were signed here at IBM corporate headquarters, a spokesman reported.

Lemelson is the president of Licensing Management Corp., a New York City-based technology development and transfer firm and holds more patents than any other private individual — more than 350 — in several different fields.

Among the patents licensed to IBM under this recent agreement are those relating to information storage, communications, magnetic recording, industrial robots, light pens, video terminals and displays, the spokesman said.

Orders & Installations

NCR Corp. has received a $16 million computer systems order from the Social Security Administration of Mexico. The agency will purchase 70 NCR I-9040 computers for use in its regional offices throughout the country.

Electronic Data Systems Corp. will assume all data processing responsibilities for the Credit Union League of Great Britain and its 66 affiliates under the terms of a recently concluded 10-year agreement.

Micro Focus, Inc. has won six software contracts with Japanese companies. The total value of these orders is $1.5 million. The six firms include Cannon, Inc., Mitsubishi Electric Corp., Hitachi Ltd., Pentel, Toyo Communications and YE Data.

Standard Logic, Inc. has won an order from the Bally Corp. for Standard's Dart restaurant point-of-sale systems valued at $1 million.

Quadstar Corp. has announced that its Mini-Host system has been ordered by Publix Super Markets for use in a shared automated teller machine network in Florida.

ICOT Corp., a manufacturer of data communications equipment, has received a $2.5 million order for intelligent terminals and associated data concentration equipment from American Airlines.

USSR to See Tech Flow Halt

(Continued from Page 77)

he said.

Subcommittee member Rep. Millicent Fenwick (R-N.J.) referred to recent allegations that exporter Werner Bruchhausen and his associates have been able to illegally ship substantial amounts of sophisticated American electronics components and technology to the Soviet Union. Brady acknowledged the diversion scheme appears to have been "well organized. It is not a bumbling effort by any means."

To help combat that kind of activity, he promised "a substantial increase in the public educational effort" by the government to allert companies to the problems of illegal shipments to the Soviet Union.

Detailing the diversion problem for the subcommittee, Richard N. Perle, assistant defense secretary for international security policy, described a "high-coordinated Soviet effort" to "raid our technology base.

"Using agents, co-opting citizens, taking advantage of unsuspecting business men and women, moving goods through neutral and Third World countries, exploiting the weaknesses in our control system, they are gaining access to Western technology on an unprecedented scale," Perle said.

As an example of the "hemorrhage" of U.S. technology, Perle said "only this past summer, millions of dollars worth of high-grade electronics polysilicon were delivered to the Soviet Union to fulfill military needs."

Supporting Brady's testimony, Perle said the Soviet Union maintains "an intelligence system keyed strongly on emerging technologies of high military value. They keep a close watch on the latest developments in the computer industry, in advanced large-scale integrated circuit design and manufacturing know-how [and] on magnetic bubble memory technology."

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The full CN '82 conference (80 sessions) is $395, and includes three luncheons and three evening sessions. The "Electronic Mail/Business Communications" two-day mini-conference is $245. Exhibit hours are 10:00-4:00.

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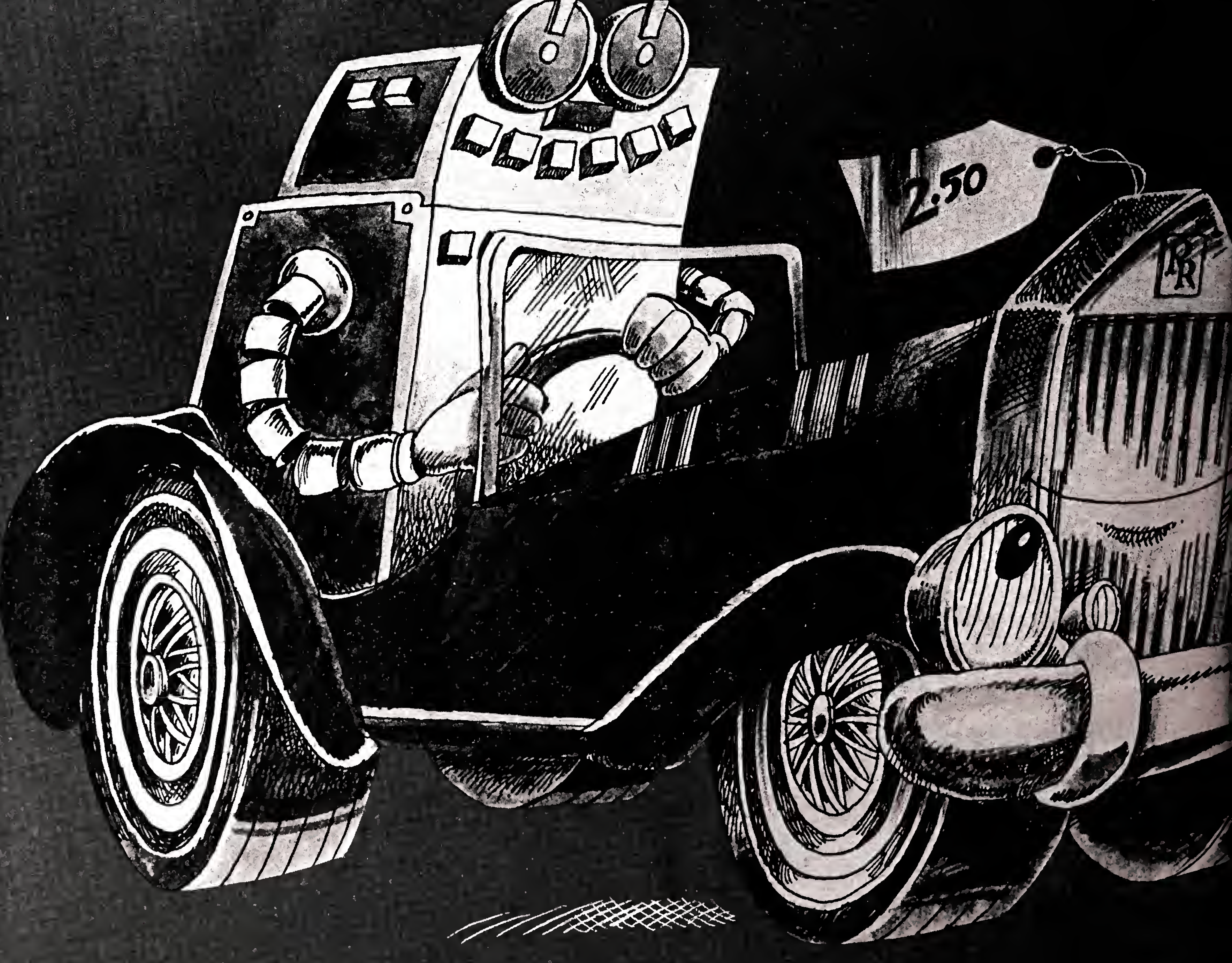

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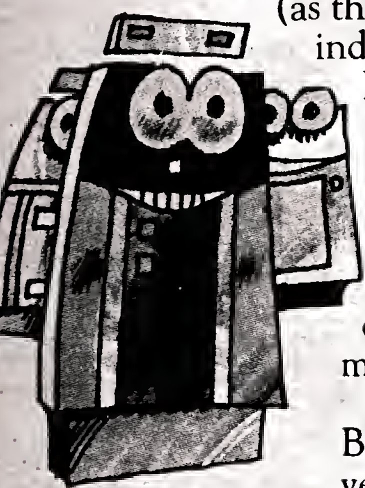
Most of our publications are weekly newspapers, because so many things happen so rapidly in the computer business (as the headline quote from a prominent industry executive makes so clear). In only thirty years the industry has gone from the development of the giant Eniac system, through the tube-powered, water-cooled Univac I (the world's first business computer), to the incredibly cheap, battery-powered microprocessor.



But as unbelievable as the last 30 years have been, the next 30 will probably be even more incredible. In the next two years alone, installed power of general purpose computer systems will grow almost as much as it did in the previous 16 years. And the supercomputers of the 90's will transfer data at a rate several hundred times faster than even today's speedy computers! It's hard to remember this is real science, not fiction.

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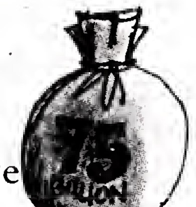

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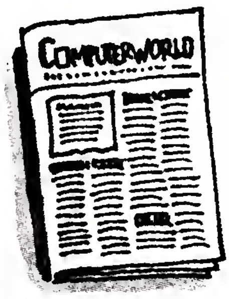

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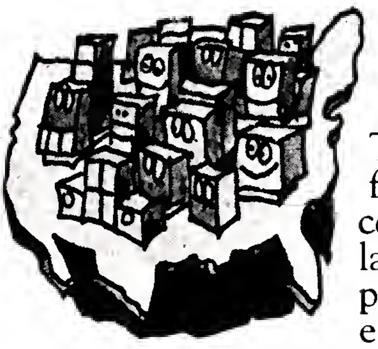

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Teaching responsibilities include courses at the undergraduate/graduate level covering technology in information science such as computer software, computer hardware, information networks and graphics. In addition to teaching ability, applicants with one or more of the following qualifications will be given preference: 1.) Experience in designing information systems or networks, 2.) Demonstrated interest in the human behavioral perspective and/or 3.) Experience in basic or applied research.

The appointee will be expected to participate in departmental and/or individual research, to advise students and to serve on departmental/university committees. In addition to the large scale computing facilities of the University, IDIS has a departmental computing facility featuring a super-mini VAX 11/780 running the Unix operating system, a PDP 11/40, the GT 44 Graphics Systems, several micros and a computing laboratory.

Rank and salary are dependent on qualifications or experience. Ph.D. is desired but not required. Preferred starting date September 2, 1982. The department earnestly seeks and is eager to receive applications from minority and women candidates. Additional information may be obtained upon request. Send resume before January 15, 1982 to Dr. James G. Williams, Chair, Faculty Search Committee, Room 712; US Building; School of Library and Information Science; University of Pittsburgh, Pittsburgh, PA. 15260. The University of Pittsburgh is an Equal Opportunity/Affirmative Action Employer.

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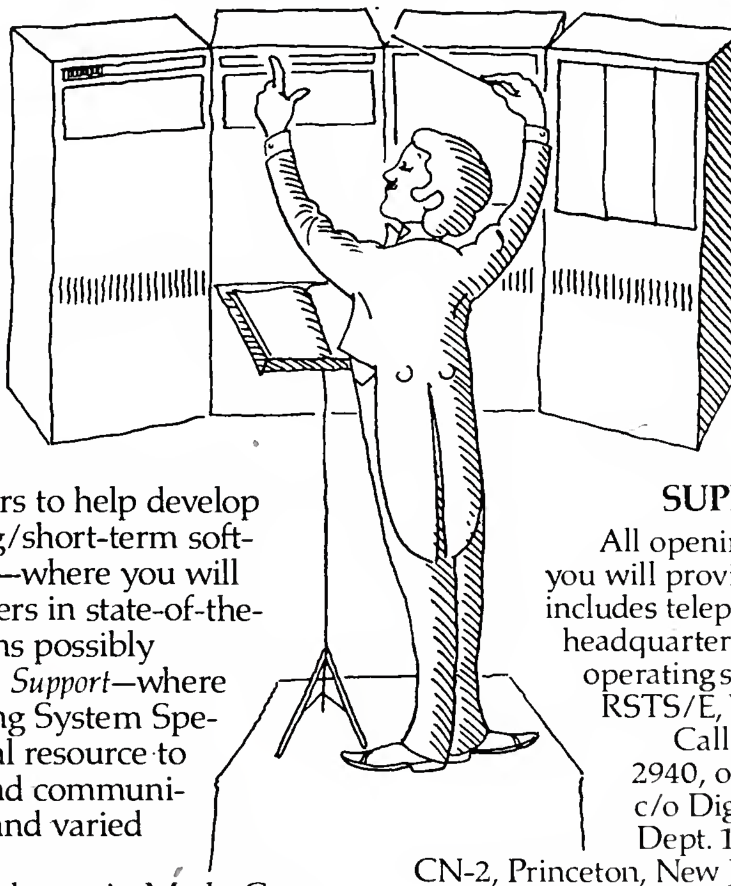

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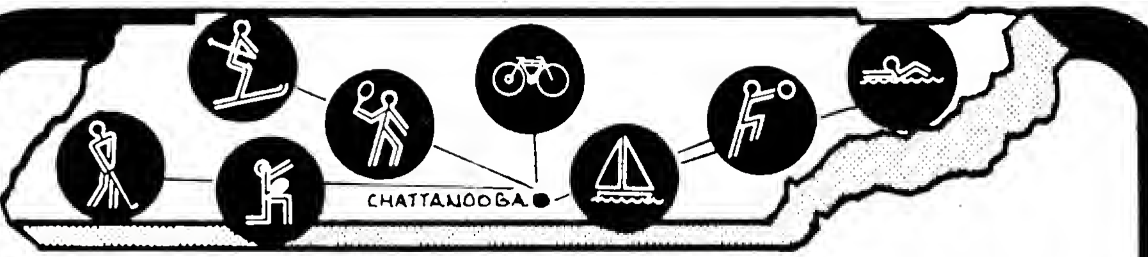

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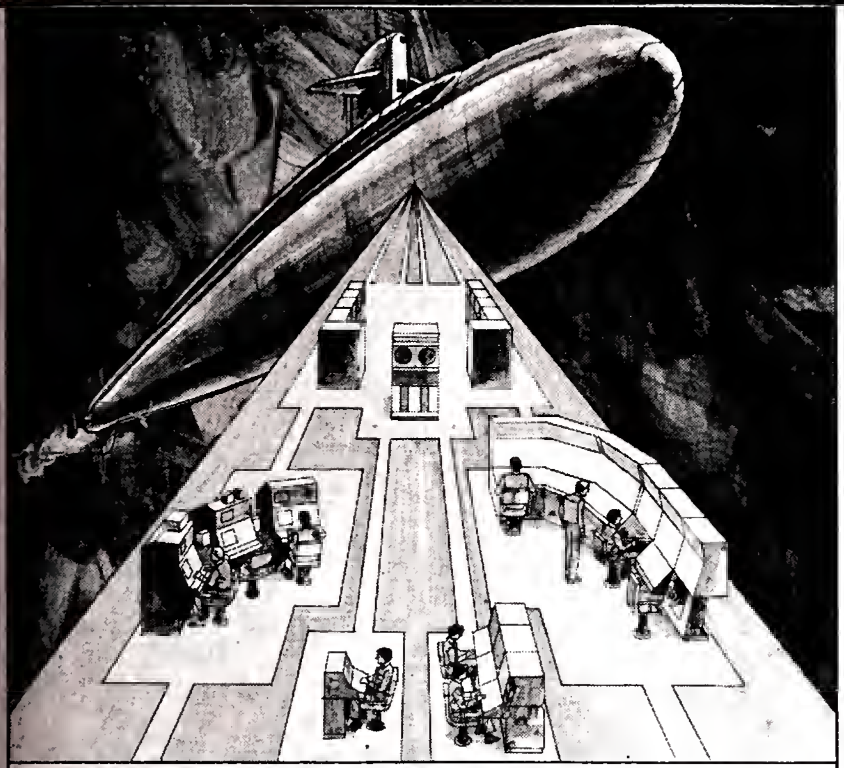

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Dr. Robert Glenn, Associate Vice President
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University of Alaska, Statewide
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DATA PROCESSING MANAGER

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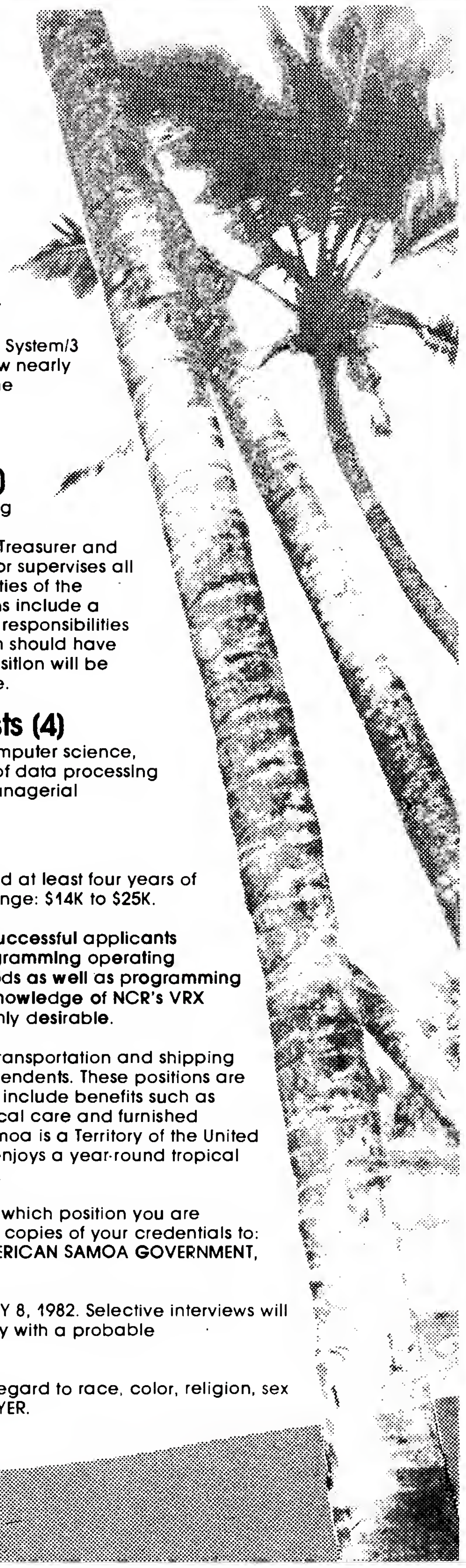

The TERRITORIAL GOVERNMENT OF AMERICAN SAMOA announces several vacancies at its Computer Center.

Earlier this year the American Samoa Government installed two 1MB NCR V8455 computer systems; these systems are replacing the government's IBM System/3 Model 10 computer. A large conversion task is now nearly completed and the government is recruiting for the following six contract positions:

Deputy Director for the Information Systems Division (1)

Responsible for planning, directing and evaluating the various functions of the Information Systems Division; under the administrative direction of the Treasurer and managing a staff of twenty-two, the Deputy Director supervises all technical and operational data processing activities of the American Samoa Government. Basic qualifications include a Bachelor's Degree and eight years of progressive responsibilities in data processing systems, at least three of which should have been on the managerial level; a salary for this position will be commensurate with qualifications and experience.

Computer Programmer/Analysts (4)

Requires a Bachelor's Degree or equivalent in computer science, mathematics or closely allied field plus six years of data processing experience; one of these positions will include managerial responsibilities. Salary range: $19K to $25K.

Computer Programmer (1)

A Bachelor's Degree or equivalent is desirable and at least four years of data processing experience is required. Salary range: $14K to $25K.

In addition to these minimum qualifications the successful applicants should have working experience using multi-programming operating software, COBOL 74, on-line concepts and methods as well as programming experience with typical financial applications. Knowledge of NCR's VRX O/S, RPG and system software support are all highly desirable.

The American Samoa Government provides free transportation and shipping allowances for contract employees and their dependents. These positions are non-Federal employment for a two year term and include benefits such as twenty-six days annual leave, free on-island medical care and furnished housing for a nominal monthly rent. American Samoa is a Territory of the United States and is located in the heart of Polynesia; it enjoys a year-round tropical climate and an informal lifestyle similar to Hawaii.

To apply for one of these vacancies, please state which position you are applying for and airmail a complete resume and copies of your credentials to: **The Director, Office of Manpower Resources, AMERICAN SAMOA GOVERNMENT, Pago Pago, American Samoa 96799.**

DEADLINE FOR RECEIVING APPLICATIONS IS JANUARY 8, 1982. Selective interviews will be conducted in the United States during February with a probable commencement date in late April 1982.

All applicants will receive consideration without regard to race, color, religion, sex or national origin. AN EQUAL OPPORTUNITY EMPLOYER.

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Midland-Ross, Midtex Division, located in N. Mankato, is seeking individuals to work in a state of the art, NCR mainframe environment. The Programmer Analyst position requires a solid background in Cobol and on-line concepts. A working knowledge of NEAT/3, VRX, and manufacturing applications is desirable.

The System Programmer position requires a knowledge of NCR/VRX and Tran-Pro. experience with total and RJE would be extremely helpful.

Midland-Ross, a Fortune 500 Company that has doubled in size in the last 5 years, and anticipates continued growth. Midtex located in North Mankato, a south central city, 1 hour from the Twin Cities, with lakes, and other recreational activities only minutes away. A state university, regional shopping and scenic beauty of the Minnesota Valley add to the attractiveness of this community.

Send resume and salary history to Personnel Manager, Midland-Ross, Midtex Division, P.O. Box 3328, North Mankato, MN 56001.

Programmer

Systems Programmer

This position has been created to support major telecommunications expansion. Three to five years of experience as a Systems Programmer on IBM/OS mainframes is required. ACF/NCP, SNA, CICS, and MVS are required. Experience in MSNF, NPDA, NCCF, NPA, TPNS, LTDA, IBM 3600 are desirable.

This position offers an excellent career opportunity in Anchorage, where there is state mortgage money, no state income tax, no sales tax and low property taxes. The Alaskan lifestyle includes clean air, no traffic jams and the ability to live in the mountains and still be only 30 minutes from work.

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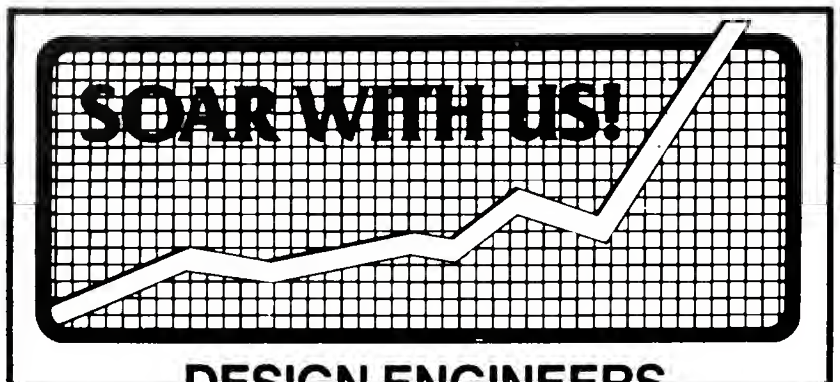
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BSEE with at least 2 years' experience in digital design using TTL/LS/S and/or processors TI990 or 9900. Responsibilities include circuit design for various data communications equipment.

BSEE with 4 years' experience in digital design. Additional experience with microprocessor at both a hardware and software interface level required. Responsibilities include the design, development and support of various developmental data communications equipment.

BS MS EE with 1-3 years' experience in digital and analog design of communications and signal processing equipment and systems. Knowledge of modem operation and application helpful. Familiarity with common digital and analog IC chips required. Fundamentals of microprocessor application desirable. Responsibilities include the design and development of various data communications and signal processing equipment.

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Immediate openings;
Analysts/Programmers/TP Specialists with experience in communications engineering, finance, power systems, inventory control, purchasing distributed systems, payroll, or personnel systems are available to individual with experience in one or more of these language; PL1, IMS-DB/DC, ADF, Mark IV, COBOL, FORTRAN, Librarian, TSO.
Systems Programmer will work with IBM 3033's running MVS/SE, JES2 and VTAM. Interested candidates should contact:

Mr. Darrell Raithel
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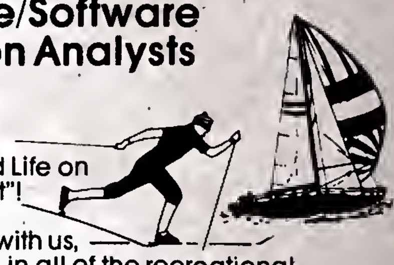

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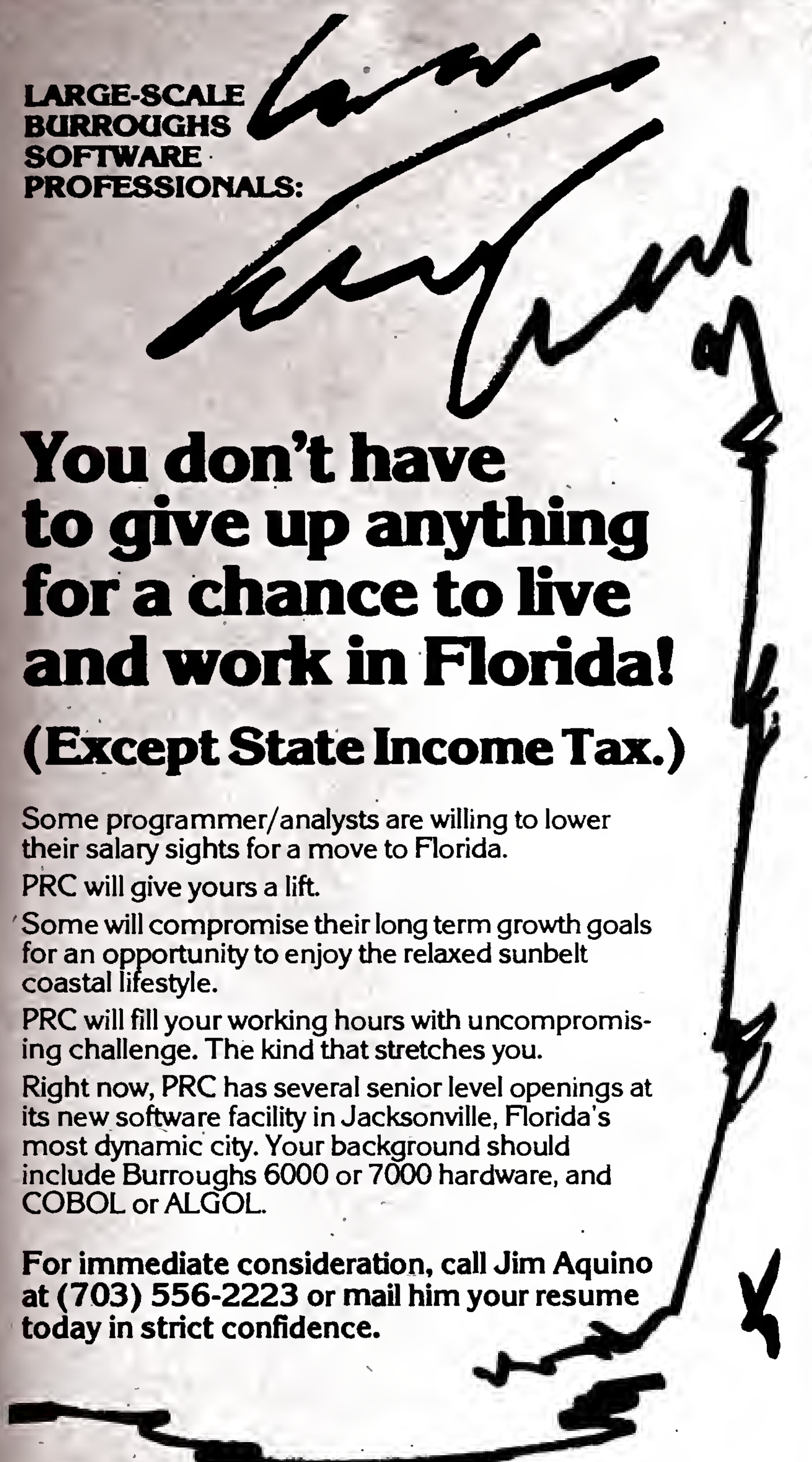

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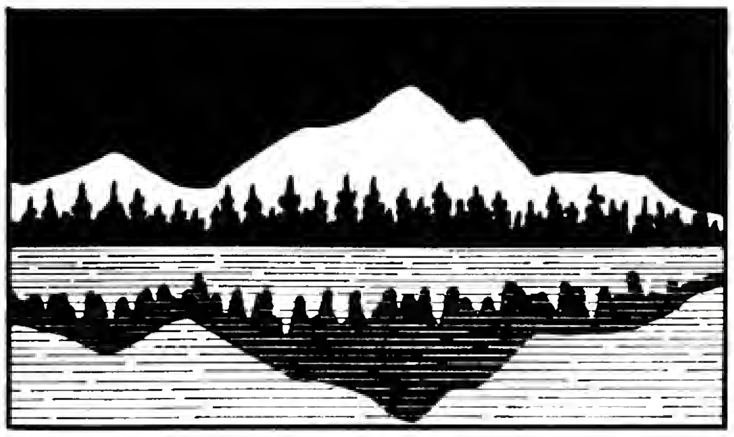

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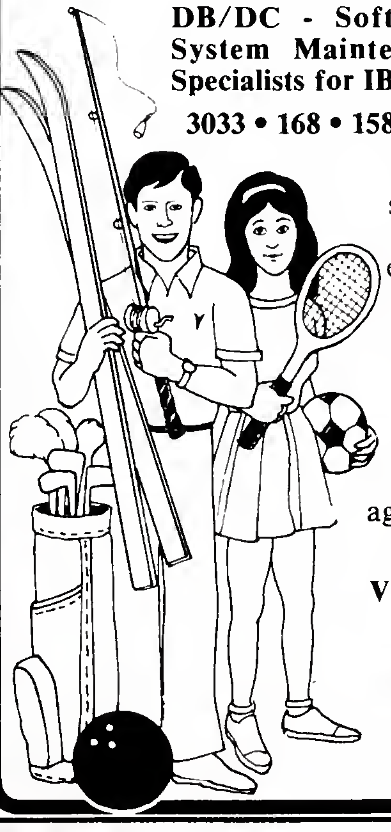

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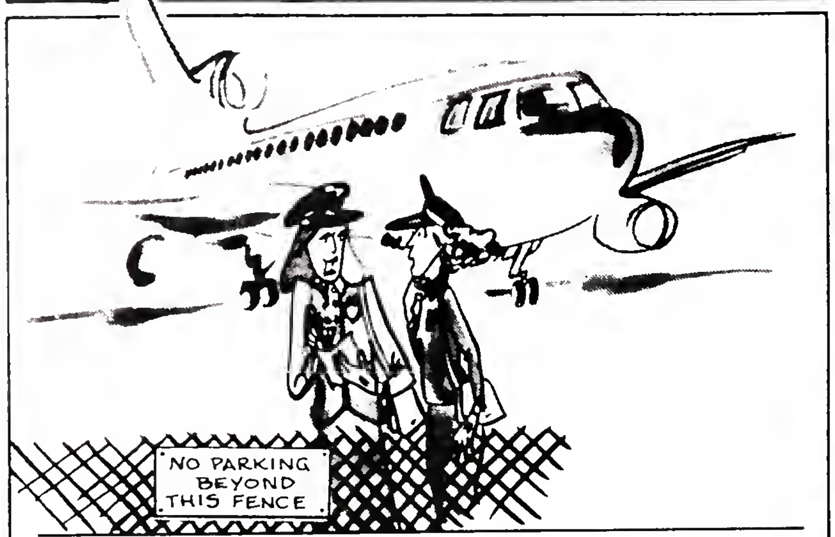

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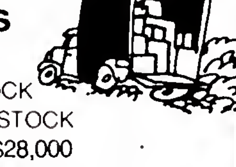

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General Request for Proposal No. 701 due 3:30 p.m., Wednesday, January 6, 1982, for the acquisition of low to medium speed synchronous and asynchronous modems ranging in speed up to 3600 baud. This is a general RFP to be used to select modems for the State of Mississippi during 1982.

General Request for Proposal No. 702 due 3:30 p.m., Wednesday, January 6, 1982, for the acquisition of medium, high, and wideband modems ranging in speed from 4800 through 56K baud. This is a general RFP to be used to select modems for the State of Mississippi during 1982.

General Request for Proposal No. 703 due 3:30 p.m., Wednesday, January 6, 1982, for the acquisition of short haul modems, line drivers and modems eliminators. This is a general RFP to be used to select special purpose modems for the State of Mississippi during 1962.

General Request for Proposal No. 704 due 3:30 p.m., Wednesday, January 6, 1982, for the acquisition of IBM 3270 compatible CRT's, printers, and controllers. This is a general RFP to be used to select terminals for the State of Mississippi through 1982.

General Request for Proposal No. 705 due 3:30 p.m., Wednesday, January 6, 1982, for the acquisition of microcomputers ranging in price up to $5,000. This is a general RFP to be used for acquiring micros for teaching, data acquisition and a variety of other purposes for the State of Mississippi during 1982.

General Request for Proposal No. 706 due 3:30 p.m., Wednesday, January 6, 1982, for the acquisition of graphics terminals, plotters and related peripherals. This is a general RFP to be used to select graphics equipment for the State of Mississippi through 1982.

General Request for Proposal No. 707 due 3:30 p.m., Wednesday, January 6, 1982, for the acquisition of ASR and KSR hardcopy terminals. This is a general RFP to be used to select terminals for the State of Mississippi during 1962.

General Request for Proposal No. 708 due 3:30 p.m., Wednesday, January 6, 1982, for the acquisition of receive-only printers to attach to TTY compatible CRT's. This is a general RFP to be used to select printers for the State of Mississippi during 1982.

General Request for Proposal No. 709 due 3:30 p.m., Wednesday, January 6, 1982, for the acquisition of TTY compatible CRT's. This is a general RFP to be used to select CRT's for the State of Mississippi during 1982.

General Request for Proposal No. 710 due 3:30 p.m., Wednesday, January 6, 1982, for the acquisition of keypunch services for State Agencies and Institutions. This is a general RFP to be used to select keypunch services for the State of Mississippi during 1982.

General Request for Proposal No. 711 due 3:30 p.m., Wednesday, January 6, 1982, for the acquisition of library network equipment and services. This is a general RFP to be used to select library network facilities for the State of Mississippi during 1982.

Request for Proposal No. 712 due 3:30 p.m., Monday, December 14, 1981, for the disposition, sale or trade of various Univac I/O equipment.

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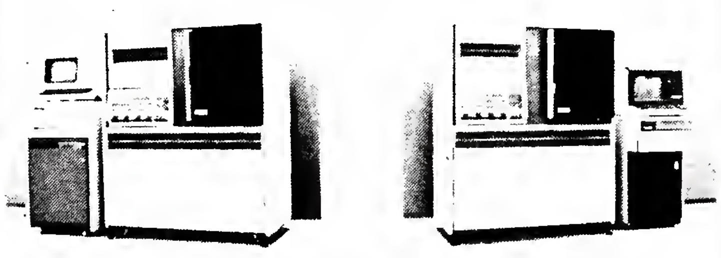

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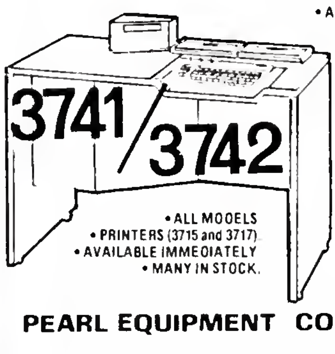

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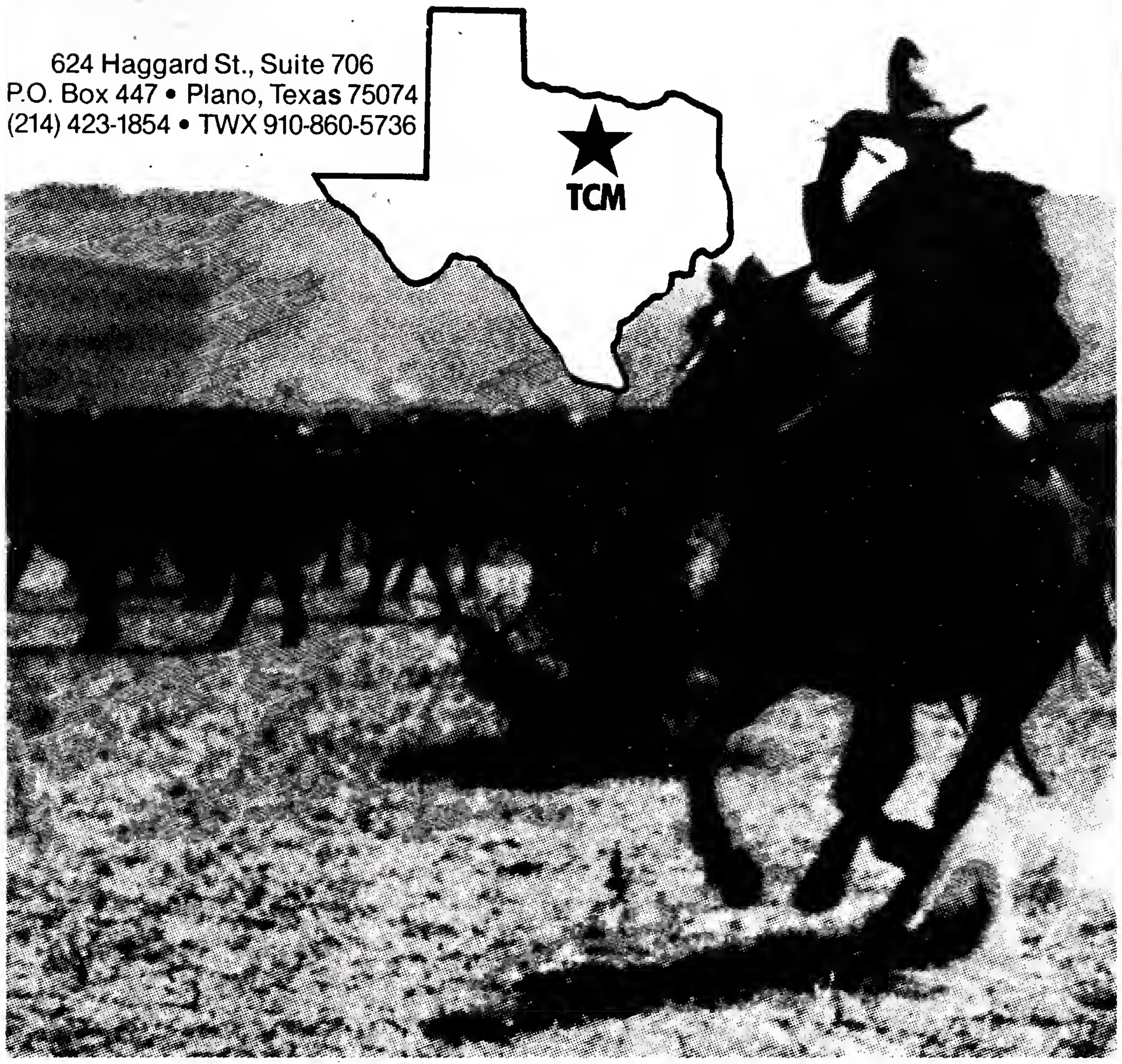

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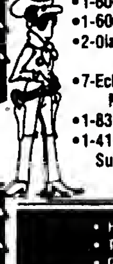

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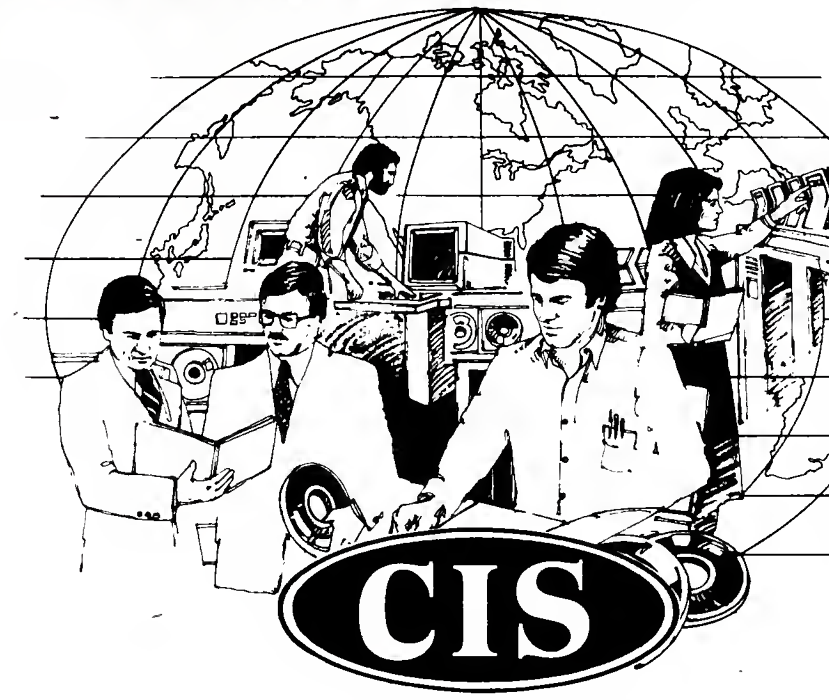

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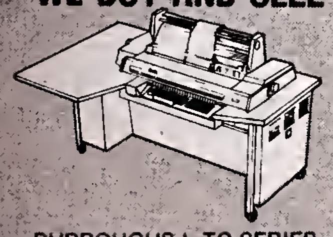

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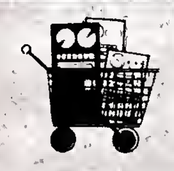

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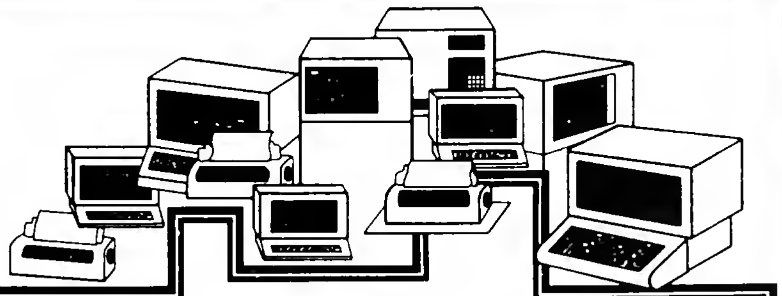

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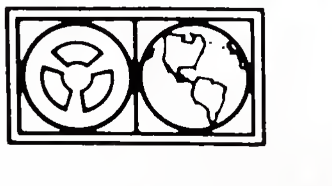

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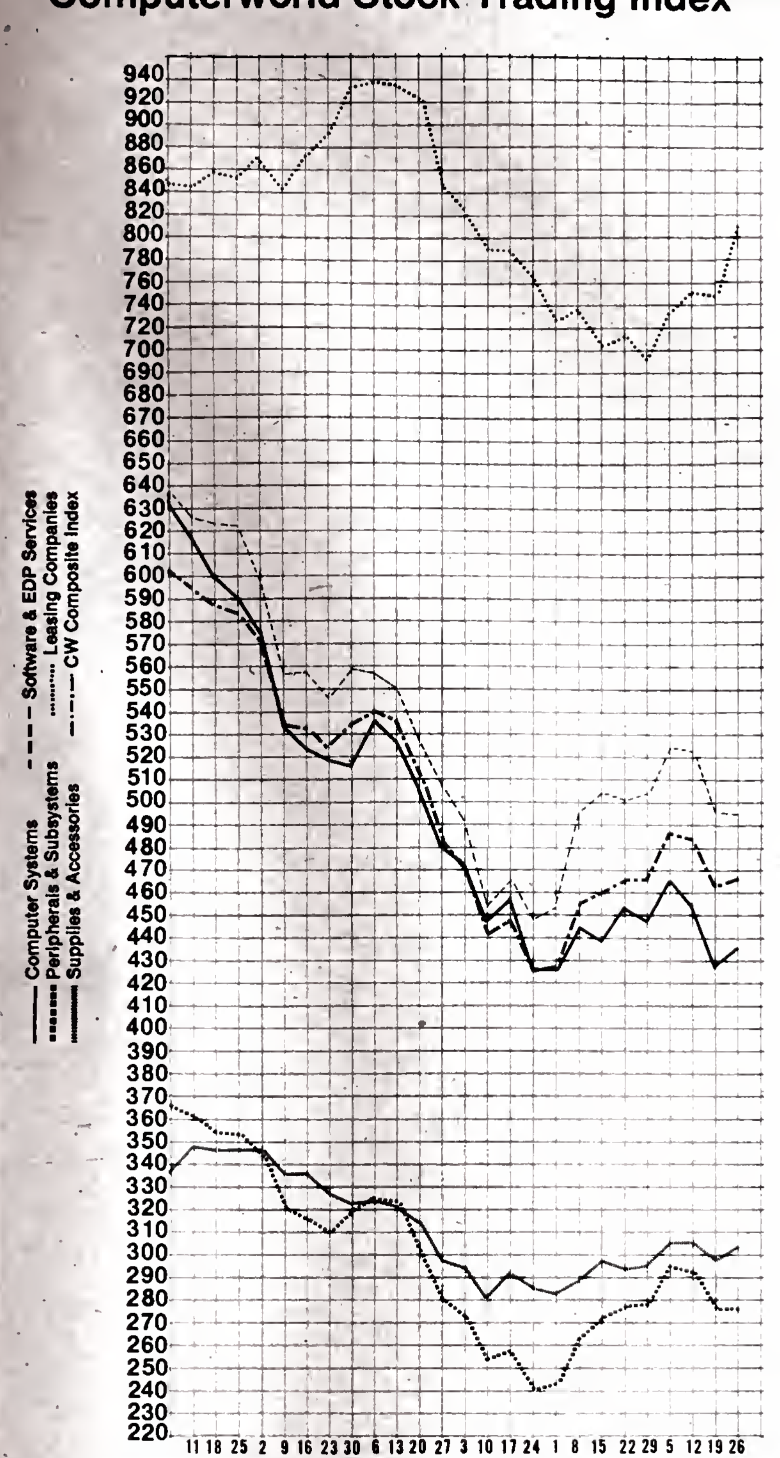

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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, NOVEMBER 18, 1981

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1980-81 RANGE (1)	CLOSE NOV 24 1981	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	23- 46	28 3/8	+ 1/8	+0.4
N	BURROUGHS CORP	28- 72	34	+2 5/8	+8.3
O	COMPUTER AUTOMATION	9- 28	12 1/4	+2	+19.5
N	CONTROL DATA CORP	19- 42	38 3/8	+1 3/8	+3.7
N	CRAY RESEARCH INC	29- 48	35 5/8	-3 3/8	-8.6
N	DATA GENERAL CORP	42- 87	55	+2 3/4	+5.2
N	DATAPOINT CORP	40- 68	47 1/8	+1 1/4	+2.7
N	DIGITAL EQUIPMENT	80-113	92 3/8	+3 7/8	+4.3
A	EECO INC	7- 19	7 1/8	- 5/8	-8.0
N	ELECTRONIC ASSOC.	5- 13	5 5/8	+ 1/2	+9.7
N	FOUR-PHASE SYSTEMS	18- 46	27 3/8	+3 5/8	+15.2
N	FOXBORO	42- 62	53 3/4	+1 1/4	+2.3
O	FULCRUM COMP GRP	1- 3	3/8	0	0.0
O	GENERAL AUTOMATION	6- 16	6	0	0.0
N	HARRIS CORP	39- 60	39 3/4	- 3/4	-1.8
N	HEWLETT-PACKARD CO	33- 54	40	0	0.0
N	HONEYWELL INC	72-115	72 1/2	-2 3/4	-3.6
N	IBM	49- 73	52 1/4	+1 7/8	+3.7
O	MAGNUSON COMP SYSTS	10- 32	9 3/4	-1 1/2	-13.3
N	MANAGEMENT ASSIST	11- 26	11 7/8	- 1/2	-4.0
O	MINI-COMPUTER SYST	1- 4	1 1/8	- 1/8	-10.0
N	MODULAR COMPUTER SYS	7- 32	7	- 1/8	-1.7
N	MOHAWK DATA SCI	11- 32	13 1/8	+ 1/4	+1.9
N	NCR	39- 76	40 3/4	+ 3/4	+1.8
N	PRIME COMPUTER INC	18- 49	23 7/8	+3 1/8	+15.0
N	PERKIN-ELMER	21- 36	24 3/4	+1 7/8	+8.1
N	SPERRY CORP	30- 65	31 7/8	+ 5/8	+2.0
O	TANDEM COMPUTERS INC	13- 35	30	+1 1/4	+4.3
N	TEXAS INSTRUMENTS	75-151	76 1/4	+ 7/8	+1.1
A	WANG LABS.	23- 46	26 3/4	0	0.0

LEASING COMPANIES

EXCH		PRICE 1980-81 RANGE (1)	CLOSE NOV 24 1981	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE FINANCIAL CP	18- 29	22 1/4	+ 3/4	+3.4
N	COMDISCO INC	16- 25	24	+1 1/4	+5.4
O	COMMERCE GROUP CORP	1- 2	1 1/8	0	0.0
O	COMPUTER INVSTRS GRP	1- 4	1/4	0	0.0
O	CONTINENTAL INFO SYS	4- 9	5	+ 1/4	+5.2
A	DCL INC	3- 4	3 5/8	0	0.0
N	DPF INC	5- 13	11 5/8	- 1/4	-2.1
O	ITEL	1- 15	7/8	+ 3/8	+75.0
O	LEASPAC CORP	1- 2	1/8	0	0.0
N	RELIANCE GROUP INC	65- 99	99	+5	+5.3
N	U.S. LEASING	18- 30	24	+ 3/4	+3.2

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
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SOFTWARE & EDP SERVICES

EXCH		PRICE 1980-81 RANGE (1)	CLOSE NOV 24 1981	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	3- 6	3	0	0.0
O	ADVANCED SYSTEMS INC	10- 15	13 1/2	+ 1/2	+3.8
O	ANACOMP INC	11- 19	12 5/8	+ 1/4	+2.0
O	ANALYSTS INTL CORP	3- 14	6 1/4	0	0.0
A	APPLIED DATA RES.	13- 25	21 3/4	+ 5/8	+2.9
N	AUTOMATIC DATA PROC	22- 32	27 3/4	- 7/8	-3.0
O	CGA COMPUTER ASSOC	4- 25	5 1/4	- 1/4	-4.5
O	COMPUTER HORIZONS	1- 5	2 3/4	- 1/4	-8.3
O	COMPUTER NETWORK	4- 9	4 1/8	- 3/8	-8.3
N	COMPUTER SCIENCES	12- 30	12 3/4	- 1/4	-1.9
O	COMPUTER TASK GROUP	13- 23	14 1/2	0	0.0
O	COMPUTER USAGE	2- 10	2 3/4	- 1/8	-4.3
O	COMSHARE	7- 21	7 3/4	0	0.0
O	CULLINANE DATABASE	15- 37	33	-1 1/4	-3.6
O	DATA DIMENSIONS INC	0- 4	1/8	0	0.0
O	DATATAB	1- 4	1 1/4	+ 1/8	+11.1
O	DSI CORP	4- 9	5 1/2	0	0.0
O	DYATRON CORP	3- 11	3	- 1/8	-4.0
N	ELECTRONIC DATA SYST	15- 30	24 1/8	+ 3/8	+1.5
O	INFORMATICS INC	17- 34	27	- 1/4	-0.9
O	INSYTE CORP	1- 3	2	+ 1/8	+6.6
O	IPS COMPUTER MARKET.	1- 4	1 3/4	0	0.0
O	KEANE ASSOCIATES	4- 8	4 3/4	- 1/4	-5.0
A	LOGICON	23- 38	29 1/8	- 3/8	-1.2
O	MNGT SCI AMER INC	17- 26	22	+ 1/2	+2.3
O	MATHEMATICA INC	12- 24	21	0	0.0
O	MATHEMATICAL APP GRP	15- 28	15 1/2	-1 1/2	-8.8
O	NATIONAL DATA CORP	14- 28	20 5/8	+1 1/8	+5.7
N	PLANNING RESEARCH	5- 13	6 1/4	+ 1/8	+2.0
O	PROGRAMMING & SYS	1- 2	1 1/8	- 1/8	-10.0
O	RAPIDATA INC	5- 16	15 3/8	+ 7/8	+6.0
O	REYNOLDS & REYNOLD	16- 26	19 3/4	0	0.0
O	SEI CORP	17- 28	25 1/2	+ 1/4	+0.9
O	STSC INC	7- 28	8	- 1/2	-5.8
O	SCIENTIFIC COMPUTERS	8- 16	7 7/8	+ 1/8	+1.6
O	SOFTWARE AG	11- 23	16 1/4	- 1/4	-1.5
N	TYMSHARE INC	23- 58	27 7/8	+2 1/4	+8.7
A	URS CORP	11- 18	13 7/8	+ 1/2	+3.7
N	WYLY CORP	7- 20	8 1/2	+ 1/8	+1.4

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1980-81 RANGE (1)	CLOSE NOV 24 1981	WEEK NET CHNGE	WEEK PCT CHNGE
N	AM INTERNATIONAL	4- 25	4 3/8	+ 3/8	+9.3
A	ANDERSON JACOBSON	10- 26	12 3/8	+ 1/8	+1.0
O	AUTO-TROL TECHNOLOGY	10- 62	11 1/2	+1	+9.5
O	BANCTEC INC	20- 35	33 1/2	+ 3/4	+2.2
O	BEEHIVE INT'L	6- 18	7 5/8	- 3/8	-4.6
A	BOLT,BERANEK & NEW	9- 25	11	- 1/4	-2.2
O	CAMBEX CORP	2- 9	3	0	0.0
N	CENTRONICS DATA COMP	7- 40	11 1/8	- 3/8	-3.2
A	CETEC CORP	4- 9	4 1/2	+ 1/4	+5.8
O	COMPUTER DEVICES INC	4- 10	6 3/4	- 1/8	-1.8
O	COGNITRONICS	3- 11	3 3/8	0	0.0
O	COMPUTER COMMUN.	1- 8	1 1/8	0	0.0
A	COMPUTER CONSOLES	19- 28	22 5/8	+1 7/8	+9.0
O	COMPUTER TRANSCEIVER	3- 9	6 1/4	- 3/8	-5.6
N	COMPUTERVISION CORP	20- 49	29 7/8	+3 1/2	+13.2
N	CONRAC CORP	17- 28	23	0	0.0
A	DATA ACCESS SYSTEMS	5- 23	6 1/2	0	0.0
A	DATAPRODUCTS CORP	19- 44	21 3/4	+1	+4.8
O	DATUM INC	2- 5	1 3/4	- 1/8	-6.6
O	DAVID JAMISON CARLYL	3- 5	4 1/2	- 1/2	-10.0
O	DECISION DATA COMPUT	3- 6	2 3/4	- 1/8	-4.3
O	DELTA DATA SYSTEMS	2- 4	2 3/4	0	0.0
O	DATARAM CORP	4- 15	6 1/8	+ 1/8	+2.0
N	ELECTRONIC M & M	3- 9	3 1/2	+ 1/9	+3.7
O	EVANS & SUTHERLAND	18- 40	33	+1 1/2	+4.7
O	FABRI-TEK	2- 6	3 3/4	- 1/4	-6.2
O	GENERAL COMPUTER SYS	1- 12	6 3/4	+ 1/4	+3.8
N	GEN'L DATA COMM IND	9- 19	8 1/2	-1 5/8	-16.0
O	GENERAL TERMINAL CP	1- 4	7/8	- 1/8	-12.5
N	HAZELTINE CORP	19- 35	24 1/2	- 5/8	-2.4
O	INFORMATION INTL INC	8- 17	13	0	0.0
O	INTEL CORP	23- 51	24 1/2	- 3/4	-2.9
O	IPL SYSTEMS INC	6- 15	7 3/4	- 1/2	-6.0
A	LUNDY ELECTRONICS	7- 18	7 3/4	+ 1/4	+3.3
A	MSI DATA CORP	11- 27	18 1/4	+1 1/8	+6.5
N	MEMOREX	8- 18	13 5/8	0	0.0
O	NETWORK SYSTEMS CORP	14- 25	21 1/8	+1	+4.9
O	OMEX	2- 12	8	0	0.0
N	PARADYNE CORP	25- 52	43 7/8	+2	+4.7
A	PENRIL CORP	9- 17	11	0	0.0
O	RAMTEK CORP	9- 23	13 3/8	- 1/8	-0.9
N	RECOGNITION EQUIP	6- 21	6	- 3/4	-11.1
O	SCAN DATA	1- 5	1 1/4	0	0.0
N	STORAGE TECHNOLOGY	18- 40	36 3/4	+ 3/8	+1.0
O	SYKES DATATRONICS	8- 34	29 3/4	+ 1/4	+0.8
A	T BAR INC	12- 19	13 7/8	+ 3/8	+2.7
A	TEC INC	4- 7	5 1/4	- 1/8	-2.3
N	TEKTRONIX INC	46- 70	53 1/8	+1 1/8	+2.1
N	TELEX	5- 9	5 3/4	+ 1/4	+4.5
O	TESDATA SYSTEMS CP	6- 17	8	- 1/8	-1.5
A	TIMEPLEX INC	9- 19	9 1/4	- 5/8	-6.3
O	WILTEK INC	1- 3	2 1/2	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1980-81 RANGE (1)	CLOSE NOV 24 1981	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMERICAN BUS PRODS	11- 17	11 3/4	+ 3/4	+6.8
O	BALTIMORE BUS FORMS	1- 2	1	0	0.0
N	BARRY WRIGHT	15- 24	17 3/8	+ 5/8	+3.7
O	CYBERMATICS INC	1- 2	1	-	-5.5
A	DUPLEX PRODUCTS INC	12- 17	12	0	0.0
N	ENNIS BUS. FORMS	15- 23	20 3/4	- 1/2	-2.3
N	3M COMPANY	48- 65	53	+3 1/8	+6.2
O	MOORE CORP LTD	27- 38	30	- 1/4	-0.8
N	NASHUA CORP	17- 33	18 1/2	+ 1/2	+2.7
O	STANDARD REGISTER	30- 41	34	0	0.0
A	TAB PRODUCTS CO	15- 30	15 3/4	- 3/4	-4.5
N	WALLACE BUS FORMS	22- 34	33 1/2	+2 3/8	+7.6

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The name McCormack & Dodge may not be a household word. But the names of our clients are. Anaconda, Encyclopaedia Britannica, Manufacturers Hanover, Marriott. And over 1,000 other top companies in banking, consumer products, food and beverage, health care, insurance, manufacturing, natural resources, paper products, publishing and transportation. We also serve smaller, growing companies, the emerging leaders whose corporate names will become household words.

The most advanced financial software ever to run on big mainframes. Now available for minicomputers.

Our general ledger and accounts payable packages, GL Plus and AP Plus, are well known to *Fortune 500* executives. And to any data processing manager with a big mainframe. Until recently, these programs were only for big computer use. But we've just succeeded in adapting them to the IBM System 34, HP 3000 and Prime 50 Series, several minicomputers that fall comfortably within the budgets of companies with sales of $18 million to $50 million a year. Not to mention the countless divisions of giant companies with their distributed data processing needs.

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When you call McCormack & Dodge and ask us to send a sales rep, we might well send a CPA. Our entire company is staffed by people who know accounting software from the client side, because they've been accountants, data processing managers and controllers. They apply this inside knowledge to create exceptionally thorough (and successful) user training programs. Our training programs make sure your system is up and running quickly. Because your people learn in a practical, hands-on environment. Errors are worked out in our classrooms, not your offices.

It's no coincidence that Canadian General Electrical believes we can, too.

McCormack & Dodge is a world company. Our systems are in operation from Minneapolis to Melbourne, and so are our offices. We've traditionally offered coast-to-coast service in the U.S. And now we offer it in Canada, too, with offices in Montreal, Toronto and Vancouver. On both sides of the Canadian border – and all around the world – prospects who sit down and talk to us do more than just talk. They become customers.

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